Upgrading the Cisco cBR Series Converged Broadband Routers for Cisco IOS XE Fuji 16.7.x

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C O N T E N T S

Upgrading the Cisco cBR-8 Router System to Cisco IOS XE Fuji 16.7.2

This section contains the upgrade procedures for the Cisco cBR-8 Router System.

The latest firmware versions after upgrade are listed in the tables below. Use the commands in the tables to verify the firmware versions.

Table 1: Firmware Versions

Internal Name	Component Name	Correct Version	Command
Supervisor CPLD	CBR-CCAP-SUP-160G Rommon CPLD	16052011	**show platform**
Supervisor ROMMON	CBR-CCAP-SUP-160G Rommon	16.6(1r)S	**show platform**
Linecard CPLD	CBR-CCAP-LC-40G CPLD	00000025	**show platform**
Linecard Uboot	CBR-CCAP-LC-40G Rommon	2011.03.18	**show platform**
Linecard PSOC	CBR-CCAP-LC-40G PSOC	4.6	**show platform diag**
Docsis 3.0 downstream module Micro	CBR-CCAP-LC-40G Gemin1 Micro	1.E	**show platform diag**
Docsis 3.0 downstream module FPGA	CBR-CCAP-LC-40G Gemini1 Apollo	2.F	**show platform diag**
Docsis 3.1 downstream module Micro	CBR-CCAP-LC-40G Gemin2 Micro	3.1A	**show platform diag**

Docsis 3.1 downstream module FPGA	CBR-CCAP-LC-40G Gemini2 Apollo	4.484B	**show platform diag**
RF-PIC Firmware	CBR-RF-PIC	00000746	**show platform diag**
RF-PROT-PIC Firmware	CBR-RF-PROT-PIC	0000071E	**show platform diag**

Upgrading from Cisco IOS-XE 3.18.1aSP to Cisco IOS XE Fuji 16.7.2

Upgrading Manually

Before you begin

Before upgrading the system, make sure the following requirements are met:

- The firmware versions are not lower than the ones listed in Firmware versions table. Otherwise upgrade the firmware versions, see Upgrading the Cisco cBR-8 Router Firmware.

- Make sure Line Card CPLD version is 00000025. If the value is lower than 00000025, follow this procedure to upgrade the Line Card CPLD to version 00000025 first:

  http://www.cisco.com/c/en/us/td/docs/cable/cbr/upgrade/guide/b_cbr_upgrade-3-18s/b_cbr_upgrade_hardware.html#task_E0B78DCCC88A41749DA2783736CE37A6

- Download two files from the following Cisco.com Software Center URL:

  https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

    - IOS XE Software Version 16.7.2: **cbrsup-universalk9.16.07.02.SPA.bin**

    - IOS XE Hardware Programmable Devices Version 16.7.2: **cbrsup-programmable_firmware.16.07.01.SPA.pkg**

- Console access for both SUPs are required.

- Ability to power cycle the chassis. Power cycle chassis is required to upgrade Supervisor CPLD.

Note   Do not power cycle the cBR-8 router during the firmware upgrade process. Power cycling the chassis may corrupt the ROMMON/Uboot image.

Step 1   Copy Cisco IOS-XE Fuji 16.7.2 package to bootflash: and stby-bootflash:.

```
copy <location>/cbrsup-universalk9.16.07.02.SPA.bin bootflash:
copy <location>/cbrsup-universalk9.16.07.02.SPA.bin stby-bootflash:
```

Step 2   Verify Cisco IOS-XE Fuji 16.7.2 package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 bootflash:cbrsup-universalk9.16.07.02.SPA.bin
verify /md5 stby-bootflash:cbrsup-universalk9.16.07.02.SPA.bin
```

Step 3   Copy the hardware programmable devices upgrade package to harddisk: and stby-harddisk:.

```
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg harddisk:
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg stby-harddisk:
```

Step 4   Verify the hardware programmable devices upgrade package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
verify /md5 stby-harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 5   Check system status prior to upgrade. Save the information to compare against the system status after upgrade. For the commands to use to check the status, see the **show** commands at the end of this section.

Step 6   Configure the chassis to boot the system with Cisco IOS-XE Fuji 16.7.2 image.

```
Configure terminal
no boot system
boot system bootflash:cbrsup-universalk9.16.07.02.SPA.bin
end
write mem
```

Step 7   Reload the cBR-8 router.

```
Reload
```

Note   The system will reload twice.

Step 8   Remove the secondary line card from line card redundancy group if redundancy is configured.

```
Configure terminal
redundancy
linecard-group 0 internal-switch
no member slot 0 secondary
end
```

Step 9   Confirm all line cards are in normal state.

```
show platform | inc LC
```

Step 10 Configure config-register to manual boot.

```
Configure terminal
config-register 0x0
end
```

Step 11 Upgrade Docsis 3.1 downstream modules in all the slots.

```
upgrade hw-programmable cable <slot> dsphy auto
pkg_name/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 12 Make sure the line card Docsis 3.1 downstream modules upgrade has completed successfully by examining the system log:

```
Show logging | include slot-id
001860: Jun 15 19:05:05.904 PDT: %IOSXE-5-PLATFORM: CLC0: cdman: Suggest reload the line card for
new FW to take effect using CLI: hw slot <slot-id> reload
```

Step 13 Upgrade Supervisor 0/1 CPLD.

```
upgrade hw-programmable cable r0 viper pkg_name
/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
upgrade hw-programmable cable r1 viper pkg_name
/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Note   Check the current Viper version.

```
Router# show platform diag
Load for five secs: 6%/1%; one minute: 7%; five minutes: 8%
Time source is NTP, 16:05:43.546 PST Thu Feb 8 2018

Chassis type: CBR-8-CCAP-CHASS

<SNIP>
Slot: SUP0, CBR-CCAP-SUP-160G
        Physical insert detect time : 00:01:58 (1d03h ago)
        CPLD version                : 16052011
        ViperSO CPLD version        : 15111401
        ViperSIO CPLD version       : 15111301
        Rommon version              : 16.7(1r)S
        Blackbird version           : 00000112
        Raptor ESI version          : 0001003b
        Raptor MAC version          : 00010031
        SUP-PIC CPLD version        : 14071504
        SUP-DC CPLD version         : 14072207
        DTI Client FPGA version     : 00000005
        DTI Firmware version        : 00000A03
        Cortina PHY version         : 201402061607
        SUP PSOC 0 version          : v4.0.9
        SUP PSOC 1 version          : v4.0.8
        SUP PSOC 2 version          : v4.1.0_IVB
        SUP PSOC 3 version          : v4.0.6
        SUP-DC PSOC 0 version       : v4.0.8
        SUP-DC PSOC 1 version       : v4.0.5
        SUP-PIC PSOC 0 version      : V2.0.6
        SUP-PIC PSOC 1 version      : V2.0.6
<SNIP>
Slot: SUP1, CBR-CCAP-SUP-160G
        Physical insert detect time : 00:02:26 (1d03h ago)
        CPLD version                : 16052011
        ViperSO CPLD version        : 15111401
        ViperSIO CPLD version       : 15111301
        Rommon version              : 16.7(1r)S
        Blackbird version           : 00000112
        Raptor ESI version          : 0001003b
        Raptor MAC version          : 00010031
        SUP-PIC CPLD version        : 14071504
        SUP-DC CPLD version         : 14072207
        DTI Client FPGA version     : 00000005
        DTI Firmware version        : 00000A03
        Cortina PHY version         : 201402061607
        SUP PSOC 0 version          : v4.0.9
        SUP PSOC 1 version          : v4.0.8
        SUP PSOC 2 version          : v4.1.0_IVB
        SUP PSOC 3 version          : v4.0.6
        SUP-DC PSOC 0 version       : v4.0.9
        SUP-DC PSOC 1 version       : v4.0.5
        SUP-PIC PSOC 0 version      : V3.0.0
        SUP-PIC PSOC 1 version      : V3.0.0

<SNIP>
```

If ViperSO CPLD version is 15111401 and ViperSIO CPLD version is 1511130 on both supervisors, then proceed to if you want to update SUP CPLD without manually powre cycling the chassis. Otherwise perform the following substeps:

a) Reload the cBR-8 router. Answer **no** to not save the configuration.

```
cBR8#reload
System configuration has been modified. Save? [yes/no]: no
Proceed with reload? [confirm]
cBR8#
```

b) Configure to automatic boot by typing following command in **rommon >** prompt.

```
rommon 1 > confreg 0x2102
rommon 2 > sync
rommon 3 >
```

c) Power cycle chassis, wait for both SUPs to auto boot to 16.7.2 image.

d) Proceed to What to do next:.

Step 14 Set Active Sup (assuming R0) to ROMMON using supervisor switchover command.

```
Redundancy force-switchover
This will cause SUP0 to go to ROMMOM prompt
```

Step 15 Using a console connection of current active SUP (SUP1), power cycle the supervisor (SUP0) using test command to set it to ROMMON:

```
test platform hardware slot R0 oir power-cycle
This command will cause the ROMMON to reset and re-initialize.   The new version of the Viper will
 now take effect.  Please verify it matches the new version

New Version = Viper version register: 0x16052011
```

Step 16 Using a console connection of SUP0 (the one in ROMMON) issue the following commands to boot that SUP:

```
Confreg 0x2
sync
reset
This will make the sup to reload twice
```

Step 17 Wait for SUP0 to become STANDBY HOT.

Step 18 Set the current active SUP (R1) to ROMMON using supervisor switchover command.

```
Redundancy force-switchover
This will cause SUP1 to go to ROMMOM prompt
```

Step 19 Using a console connection of current active SUP (SUP0), power cycle the supervisor (SUP1) using test command to set it to ROMMON:

```
test platform hardware slot R1 oir power-cycle
This command will cause the ROMMON to reset and re-initialize.   The new version of the Viper will
 now take effect.  Please verify it matches the new version

New Version = Viper version register: 0x16052011
```

Step 20 Using a console connection of SUP1 (the one in ROMMON) issue the following commands to boot that SUP:

```
Confreg 0x2
sync
reset
This will make the sup to reload twice
```

Step 21 Wait for SUP1 to become STANDBY HOT.

Step 22 Reload the standby line card to set DOCSIS 3.1 downstrem module firmware active.

```
Hw-module slot 0 reload
```

Step 23   Wait for Slot 0 to become Stdby Warm.

Step 24   Reload primary line card one at a time by following these steps:

a) **hw-module slot 1 reload**

b) Wait for slot 1 to become Stdby Hot by examining output of **show redundancy linecard all**

c) Redundancy linecard-group switchover from slot 0.

d) Wait for slot 0 to become Stdby Warm.

Step 25   Proceed to What to do next:.

What to do next

Perform verification test to determine if the upgrade is successful, include:

- Verify the router is running the new IOS-XE release using **show version** command.

- Check facility alarms using **show facility-alarm status** command.

- Check the status of the power supplies using **show environment power** command.

- Check PS status using **show platform hardware slot P<0-5> mcu status** command.

- Complete trace routes to known good off-network IP address using the source address of customer CPE blocks to verify routing is working.

- Check logs for error messages using **show log** command.

These **show** commands may be useful in the verification test:

- **show redundancy**

- **show platform**

- **show platform diag**

- **show environment**

- **show redundancy linecard all**

- **show isis neighbors**

- **show ip ospf neighbor**

- **show ip route rip**

- **show ip mroute**

- **show cops servers**

- **show cable modem voice**

- **show cable calls**

- **show cable metering verbose**

- **show cable licenses all**

> • **show inventory**

Upgrading with Ansible

Before you begin

Before upgrading the firmware, make sure the following requirements are met:

1. Prepare Ansible Server, operating system can be Linux/Windows/Mac, with docker service pre-installed.

    For docker installation guide, please check following link:

    https://docs.docker.com/engine/installation/

2. Check if the chassis supports AAA or local authentication with username & password. If not configured, use following CLI to enable local authentication, for example:

    ```
    Cbr8#configure terminal
    Enter configuration commands, one per line.  End with CNTL/Z.
    cBR8(config)#username cisco privilege 15 password 0 cisco
    cBR8(config)#enable secret cisco
    cBR8(config)#line vty 0 15
    cBR8(config)#login local
    cBR8(config)#exec-timeout 0 0
    cBR8(config)#session-timeout 0
    cBR8(config)#exit
    ```

3. If SSH is not enabled, use following CLI to enable SSH on cBR8, skip the domain name configuration if already configured.

    ```
    cBR8(config)# ip domain-name domain.com
    cBR8(config)#crypto key generate rsa
    The name for the keys will be: cbr8.domain.com
    Choose the size of the key modulus in the range of 360 to 4096 for your
    General Purpose Keys. Choosing a key modulus greater than 512 may take
    a few minutes.

    How many bits in the modulus [512]: 1024
    % Generating 1024 bit RSA keys, keys will be non-exportable...
    [OK] (elapsed time was 0 seconds)

    cBR8(config)#end
    cBR8#copy running-config startup-config
    cBR8#show ip ssh
    SSH Enabled - version 1.99
    ```

4. Check if there is enough bootflash disk space on both SUP (>1.8GB).

5. Verify if the Ansible server can access cBR-8 using SSH.

    ```
    [ansible@server ~]$ ssh cisco@100.0.0.1
    The authenticity of host '100.0.0.1 (100.0.0.1)' can't be established.
    RSA key fingerprint is c3:be:8f:cf:76:f4:31:4b:80:d8:2e:f0:76:6d:ff:bf.
    Are you sure you want to continue connecting (yes/no)? yes
    Warning: Permanently added '100.0.0.1' (RSA) to the list of known hosts.
    Password:
    cBR8#
    ```

6. Download three files from the following Cisco.com Software Center URL:

    https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

- IOS XE Software Version 16.7.2: **cbrsup-universalk9.16.07.02.SPA.bin**

- IOS XE Hardware Programmable Devices Version 16.7.1:
  cbrsup-programmable_firmware.16.07.01_compat_with_3.18SP.SSA.pkg

- Ansible upgrade script: **cbr-8_upgrade_ansible_16.7.1a.tar**

7. Copy IOS XE Software package and IOS XE Hardware Programmable Devices package to TFTP/FTP/SCP server or usb disk. Upload Ansible upgrade script to Ansible server.

8. Console access for both SUPs are required.

9. Ability to power cycle the chassis. Power cycle chassis is required to upgrade Supervisor CPLD.

Step 1 Run following CLI on the Ansible server to create the docker image.

```
docker import cbr-8_upgrade_ansible_16.7.1a.tar ansible_mop
```

Step 2 Start docker container with the image and enter the container shell.

```
docker run -it --name=mop ansible_mop /bin/bash
```

Step 3 Change current directory to the playbook folder for this software and firmware upgrade.

```
cd /opt/cbr-8_upgrade_ansible_3.18sp_to_16.7.2
```

Step 4 Modify hosts file to add target cBR-8 ip addresses, can be multiple lines if customer wants to upgrade firmware on multiple cBR8 routers simultaneously, sample file is as below:

```
[cbr]
100.110.110.110
100.185.185.185
```

Step 5 Modify secrets.yaml file, change the username/password/enable password to reflect the real username/password/enable configuration for target cBR. If no enable password is set, just keep the sample **cisco** for **auth_pass**.

```
creds:
  username: cisco
  password: cisco
  auth_pass: cisco
```

Step 6 Modify upgrade_vars.yaml file to indicate the firmware package name, ios image name and source (Optional if the package files are already on cbr-8 harddisk:).

```
file_info:
  image_name: cbrsup-universalk9.16.07.02.SPA.bin
  pkg_name: cbrsup-programmable_firmware.16.07.01_compat_with_3.18SP.SSA.pkg
  #if the pkg file in the TB, just modify dst_dir to the pkg location
  #the four examples shows the usage
  #example1
  #src_dir: "ftp://username:password@20.11.0.42:~/"
  #example2
```

```
#src_dir: "tftp://192.168.3.47/ "
#example3
#src_dir: "usb0:"
#example4
src_dir: "harddisk:"

slot_info:
  #slot_to_upgrade: [2,3,6,7,8,9]
  slot_to_upgrade: "ALL"
```

Step 7   Modify md5_map.yaml file in the folder **version_file** to add new image label and md5 value.

```
pkg_md5:
  cbrsup-programmable_firmware.16.07.01_compat_with_3.18SP.SSA.pkg: 292e26e20b038147f3443a5977415465
image_md5:
  cbrsup-universalk9.16.07.02.SPA.bin: a05c281922eb56adc2fe025cf174360c
```

Step 8   Execute following command to start the playbook to upgrade firmware.

./run_mop_upgrade

Step 9   Reload the system by typing **reload** on the active SUP and answering **no** to not save the configuration.

```
cBR8#reload
System configuration has been modified. Save? [yes/no]: no
Proceed with reload? [confirm]
cBR8#
```

Step 10   From ROMMON issue the following command on both SUPs.

```
rommon 1 > confreg 0x2102
rommon 2 > sync
rommon 3 >
```

Step 11   Power cycle chassis, wait for both SUPs to auto boot to 16.7.2 image.

```
rommon 1>
Initializing Hardware ...

?

System Bootstrap, Version 16.6(2r)S, RELEASE SOFTWARE
Copyright (c) 1994-2016  by cisco Systems, Inc.

Current image running: Boot ROM1

Last reset cause: PowerOn

Viper version register: 0x16052011
Set Chassis Type to 13RU
Cisco cBR-8  platform with 50331648 Kbytes of main memory
```

Step 12   After system bootup and stable, execute following command to start the playbook to check the upgrade result.

```
./run_mop_upgrade_post

…
TASK [debug] ********************************************************************
Friday 17 March 2017  14:30:25 +0800 (0:00:00.014)        0:01:10.187 **********
ok: [100.185.185.185] => {
    "msg": "Mop upgrade passed!"
}
PLAY RECAP **********************************************************************
100.185.185.185               : ok=120   changed=1    unreachable=0    failed=0
```

Step 13 Exit the container if finished upgrading this time to stop the container.

exit

Step 14 If user wants to start the container again, use following command to start the container and enter its shell.

docker start mop
docker attach mop

Step 15 All the file changes are kept in the container, user can run step 4-11 to upgrade again.

Upgrading from Cisco IOS XE Everest 16.5.1 to Cisco IOS XE Fuji 16.7.2

Before you begin

Before upgrading the system, make sure the following requirements are met:

- Download two files from the following Cisco.com Software Center URL:

  https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

    - IOS XE Software Version 16.7.2: **cbrsup-universalk9.16.07.02.SPA.bin**

    - IOS XE Hardware Programmable Devices Version 16.7.2:
      cbrsup-programmable_firmware.16.07.01.SPA.pkg

✎

Note Do not power cycle the cBR-8 router during the firmware upgrade process. Power cycling the chassis may corrupt the ROMMON/Uboot image.

Step 1 Copy Cisco IOS-XE Fuji 16.7.2 package to bootflash: and stby-bootflash:.

```
copy <location>/cbrsup-universalk9.16.07.02.SPA.bin bootflash:
copy <location>/cbrsup-universalk9.16.07.02.SPA.bin stby-bootflash:
```

Step 2 Verify Cisco IOS-XE Fuji 16.7.2 package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 bootflash:cbrsup-universalk9.16.07.02.SPA.bin
verify /md5 stby-bootflash:cbrsup-universalk9.16.07.02.SPA.bin
```

Step 3 Copy the hardware programmable devices upgrade package to harddisk: and stby-harddisk:.

```
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg harddisk:
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg stby-harddisk:
```

Step 4 Verify the hardware programmable devices upgrade package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
verify /md5 stby-harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 5 Check system status prior to upgrade. Save the information to compare against the system status after upgrade. For the commands to use to check the status, see the **show** commands at the end of this section.

Step 6 Configure the chassis to boot the system with Cisco IOS-XE Fuji 16.7.2 image.

```
Configure terminal
no boot system
boot system bootflash:cbrsup-universalk9.16.07.02.SPA.bin
end
write mem
```

Step 7 If the system is not set to autoboot, set the system to autoboot on reload.

```
Configure terminal
config-register 0x2102
end
```

Step 8 Confirm all line card are in OK state.

```
show platform | include LC
```

Step 9 Upgrade Docsis 3.1 downstream modules in all the slots.

```
upgrade hw-programmable cable <slot> dsphy auto
pkg_name/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 10 Wait for the system log message asking the user to reload the line card that was upgraded.

```
001860: Jun 15 19:05:05.904 PDT: %IOSXE-5-PLATFORM: CLC0: cdman: Suggest reload the line card for
new FW to take effect using CLI: hw slot <slot-id> reload
```

Step 11   Reload the cBR-8 router.

```
reload
```

Note   The system will reload twice.

What to do next

Perform verification test to determine if the upgrade is successful, include:

- Verify the router is running the new IOS-XE release using **show version** command.

- Check facility alarms using **show facility-alarm status** command.

- Check the status of the power supplies using **show environment power** command.

- Check PS status using **show platform hardware slot P<0-5> mcu status** command.

- Complete trace routes to known good off-network IP address using the source address of customer CPE blocks to verify routing is working.

- Check logs for error messages using **show log** command.

These **show** commands may be useful in the verification test:

- **show redundancy**

- **show platform**

- **show platform diag**

- **show environment**

- **show redundancy linecard all**

- **show isis neighbors**

- **show ip ospf neighbor**

- **show ip route rip**

- **show ip mroute**

- **show cops servers**

- **show cable modem voice**

- **show cable calls**

- **show cable metering verbose**

- **show cable licenses all**

- **show inventory**

Upgrading from Cisco IOS XE Everest 16.6.x to Cisco IOS XE Fuji 16.7.2 with ISSU

Before you begin

Before upgrading the system, make sure the following requirements are met:

- Download two files from the following Cisco.com Software Center URL:

  https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

  - IOS XE Software Version 16.7.2: **cbrsup-universalk9.16.07.02.SPA.bin**

  - IOS XE Hardware Programmable Devices Version 16.7.2: **cbrsup-programmable_firmware.16.07.01.SPA.pkg**

Note Do not power cycle the cBR-8 router during the firmware upgrade process. Power cycling the chassis may corrupt the ROMMON/Uboot image.

Step 1 Copy Cisco IOS-XE Fuji 16.7.2 package to bootflash: and stby-bootflash:.

```
copy <location>/cbrsup-universalk9.16.07.02.SPA.bin bootflash:
copy <location>/cbrsup-universalk9.16.07.02.SPA.bin stby-bootflash:
```

Step 2 Verify Cisco IOS-XE Fuji 16.7.2 package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 bootflash:cbrsup-universalk9.16.07.02.SPA.bin
verify /md5 stby-bootflash:cbrsup-universalk9.16.07.02.SPA.bin
```

Step 3 Copy the hardware programmable devices upgrade package to harddisk: and stby-harddisk:.

```
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg harddisk:
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg stby-harddisk:
```

Step 4 Verify the hardware programmable devices upgrade package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
verify /md5 stby-harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 5 Check system status prior to upgrade. Save the information to compare against the system status after upgrade. For the commands to use to check the status, see the **show** commands at the end of this section.

Step 6   Upgrade Docsis 3.1 downstream modules in all the slots.

```
upgrade hw-programmable cable <slot> dsphy micro
pkg_name/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 7   Wait for the system log message asking the user to reload the line card that was upgraded.

```
001860: Jun 15 19:05:05.904 PDT: %IOSXE-5-PLATFORM: CLC0: cdman: Suggest reload the line card for
new FW to take effect using CLI: hw slot <slot-id> reload
```

Step 8   Before the ISSU upgrade please check and make sure:

- The cBR-8 is in Subpackage mode.

- Both SUPs are running same image from same path.

- Autoboot is enabled.

- The cBR-8 has two SUP and in SSO mode, standby SUP is in standby hot mode.

- All linecards are in normal state in LCHA group. Use **show redundancy linecard all** command, active cards should be in **Stdby Warm** state.

- There is enough bootflash disk space on both SUP.

Step 9   Copy 16.7.2 image in the same folder of current boot package on active SUP.

Step 10   Make sure .issu folder and config files exists on both active and standby SUP harddisk. If no such folder exists or files missing, create a new one and generate files needed.

Step 11   Perform ISSU.

```
request platform software package install node file bootflash:cbrsup-universalk9.16.07.02.SPA.bin
```

Step 12   To monitor the ISSU progress, use the command below.

```
request platform software package install node attach
```

Step 13   Use these CLI to check status after ISSU.

```
show version
show version r0 running
show version r1 running
show version r0 provisioned
show version r1 provisioned
```

Note   If both Docsis 3.1 OFDM channels and downstream load balancing are configured, then Docsis 3.1 CMs will come up in a Docsis 3.0 bonding group after ISSU from Cisco IOS XE Everest 16.6.x. The workaround procedure is:

a. Admin shut all OFDM channels. This can be done from a script, or from cut and paste of the CLI. There is no need to have a delay between successive shuts. For example:

```
configure terminal
    controller Integrated-Cable 2/0/0
        rf-chan 158
            shut
end
```

b. Wait for 30 seconds.

c. Admin perform no-shut on all OFDM channels. This may be done from a script, or from cut and paste of the CLI. There is no need to have a delay between successive no-shuts. For example:

```
configure terminal
    controller Integrated-Cable 2/0/0
        rf-chan 158
            no shut
end
```

d. Reset all Docsis 31 CMs. For example:

```
clear cable modem d31-capable reset
```

What to do next

Perform verification test to determine if the upgrade is successful, include:

- Verify the router is running the new IOS-XE release using **show version** command.

- Check facility alarms using **show facility-alarm status** command.

- Check the status of the power supplies using **show environment power** command.

- Check PS status using **show platform hardware slot P<0-5> mcu status** command.

- Complete trace routes to known good off-network IP address using the source address of customer CPE blocks to verify routing is working.

- Check logs for error messages using **show log** command.

These **show** commands may be useful in the verification test:

- **show redundancy**

- **show platform**

- **show platform diag**

- **show environment**

- **show redundancy linecard all**

- **show isis neighbors**

- **show ip ospf neighbor**

- **show ip route rip**

- **show ip mroute**

- **show cops servers**

- **show cable modem voice**

- **show cable calls**

- **show cable metering verbose**

- **show cable licenses all**

- **show inventory**

Upgrading the Cisco cBR-8 Router System to Cisco IOS XE Fuji 16.7.1b

This section contains the upgrade procedures for the Cisco cBR-8 Router System.

Upgrading from Cisco IOS-XE 3.18.1aSP to Cisco IOS XE Fuji 16.7.1b

The correct firmware versions are listed in the tables below. Use the commands in the tables to verify the firmware versions.

Table 2: Firmware Versions

Internal Name	Component Name	Correct Version	Command
Supervisor CPLD	CBR-CCAP-SUP-160G Rommon CPLD	16052011	**show platform**
Supervisor ROMMON	CBR-CCAP-SUP-160G Rommon	16.6(1r)S	**show platform**
Linecard CPLD	CBR-CCAP-LC-40G CPLD	00000025	**show platform**
Linecard Uboot	CBR-CCAP-LC-40G Rommon	2011.03.18	**show platform**
Linecard PSOC	CBR-CCAP-LC-40G PSOC	4.6	**show platform diag**
Docsis 3.0 downstream module PSOC	CBR-CCAP-LC-40G Gemin1 PSOC	3.9	**show platform diag**

Docsis 3.0 downstream module CPLD	CBR-CCAP-LC-40G Gemini1 CPLD	0.7	show platform diag
Docsis 3.0 downstream module Micro	CBR-CCAP-LC-40G Gemin1 Micro	1.E	show platform diag
Docsis 3.0 downstream module FPGA	CBR-CCAP-LC-40G Gemini1 Apollo	2.F	show platform diag
Docsis 3.1 downstream module PSOC	CBR-CCAP-LC-40G Gemin2 PSOC	4.4	show platform diag
Docsis 3.1 downstream module CPLD	CBR-CCAP-LC-40G Gemini2 CPLD	0.7	show platform diag
Docsis 3.1 downstream module Micro	CBR-CCAP-LC-40G Gemin2 Micro	3.1A	show platform diag
Docsis 3.1 downstream module FPGA	CBR-CCAP-LC-40G Gemini2 Apollo	4.484B	show platform diag
RF-PIC Firmware	CBR-RF-PIC	00000746	show platform diag
RF-PROT-PIC Firmware	CBR-RF-PROT-PIC	0000071E	show platform diag

Upgrading Manually

Before you begin

Before upgrading the system, make sure the following requirements are met:

- The firmware versions are not lower than the ones listed in Firmware versions table. Otherwise upgrade the firmware versions, see Upgrading the Cisco cBR-8 Router Firmware.

- Make sure Line Card CPLD version is 00000025. If the value is lower than 00000025, follow this procedure to upgrade the Line Card CPLD to version 00000025 first:

  http://www.cisco.com/c/en/us/td/docs/cable/cbr/upgrade/guide/b_cbr_upgrade-3-18s/b_cbr_upgrade_hardware.html#task_E0B78DCCC88A41749DA2783736CE37A6

- Download two files from the following Cisco.com Software Center URL:

  https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

  - IOS XE Software Version 16.7.1b: **cbrsup-universalk9.16.07.01b.SPA.bin**

- IOS XE Hardware Programmable Devices Version 16.7.1:
  cbrsup-programmable_firmware.16.07.01.SPA.pkg

- Console access for both SUPs are required.

- Ability to power cycle the chassis. Power cycle chassis is required to upgrade Supervisor CPLD.

Note Do not power cycle the cBR-8 router during the firmware upgrade process. Power cycling the chassis may corrupt the ROMMON/Uboot image.

Step 1 Copy Cisco IOS-XE Fuji 16.7.1b package to bootflash: and stby-bootflash:.

```
copy <location>/cbrsup-universalk9.16.07.01b.SPA.bin bootflash:
copy <location>/cbrsup-universalk9.16.07.01b.SPA.bin stby-bootflash:
```

Step 2 Verify Cisco IOS-XE Fuji 16.7.1b package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 bootflash:cbrsup-universalk9.16.07.01b.SPA.bin
verify /md5 stby-bootflash:cbrsup-universalk9.16.07.01b.SPA.bin
```

Step 3 Copy the hardware programmable devices upgrade package to harddisk: and stby-harddisk:.

```
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg harddisk:
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg stby-harddisk:
```

Step 4 Verify the hardware programmable devices upgrade package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
verify /md5 stby-harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 5 Check system status prior to upgrade. Save the information to compare against the system status after upgrade. For the commands to use to check the status, see the **show** commands at the end of this section.

Step 6 Configure the chassis to boot the system with Cisco IOS-XE Fuji 16.7.1b image.

```
Configure terminal
no boot system
boot system bootflash:cbrsup-universalk9.16.07.01b.SPA.bin
end
write mem
```

Step 7 Reload the cBR-8 router.

```
Reload
```

Note   The system will reload twice.

Step 8   Remove the secondary line card from line card redundancy group if redundancy is configured.

```
Configure terminal
redundancy
linecard-group 0 internal-switch
no member slot 0 secondary
end
```

Step 9   Configure config-register to manual boot.

```
Configure terminal
config-register 0x0
end
```

Step 10   Upgrade Docsis 3.1 downstream modules in all the slots.

```
upgrade hw-programmable cable <slot> dsphy auto
pkg_name/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 11   Upgrade Supervisor 0/1 CPLD.

```
upgrade hw-programmable cable r0 viper pkg_name
/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
upgrade hw-programmable cable r1 viper pkg_name
/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 12   Make sure the line card Docsis 3.1 downstream modules upgrade has completed successfully by examining the system log:

```
Show logging | include slot-id
001860: Jun 15 19:05:05.904 PDT: %IOSXE-5-PLATFORM: CLC0: cdman: Suggest reload the line card for
new FW to take effect using CLI: hw slot <slot-id> reload
```

Step 13   Reload the cBR-8 router. Answer **no** to not save the configuration.

```
cBR8#reload
System configuration has been modified. Save? [yes/no]: no
Proceed with reload? [confirm]
cBR8#
```

Step 14   Configure to automatic boot by typing following command in **rommon >** prompt.

```
rommon 1 > confreg 0x2102
rommon 2 > sync
rommon 3 >
```

Step 15 Power cycle chassis, wait for both SUPs to auto boot to 16.7.1b image.

What to do next

Perform verification test to determine if the upgrade is successful, include:

- Verify the router is running the new IOS-XE release using **show version** command.

- Check facility alarms using **show facility-alarm status** command.

- Check the status of the power supplies using **show environment power** command.

- Check PS status using **show platform hardware slot P<0-5> mcu status** command.

- Complete trace routes to known good off-network IP address using the source address of customer CPE blocks to verify routing is working.

- Check logs for error messages using **show log** command.

These **show** commands may be useful in the verification test:

- **show redundancy**

- **show platform**

- **show platform diag**

- **show environment**

- **show redundancy linecard all**

- **show isis neighbors**

- **show ip ospf neighbor**

- **show ip route rip**

- **show ip mroute**

- **show cops servers**

- **show cable modem voice**

- **show cable calls**

- **show cable metering verbose**

- **show cable licenses all**

- **show inventory**

Upgrading with Ansible

Before you begin

Before upgrading the firmware, make sure the following requirements are met:

1. Prepare Ansible Server, operating system can be Linux/Windows/Mac, with docker service pre-installed.

   For docker installation guide, please check following link:

   https://docs.docker.com/engine/installation/

2. Check if the chassis supports AAA or local authentication with username & password. If not configured, use following CLI to enable local authentication, for example:

   ```
   Cbr8#configure terminal
   Enter configuration commands, one per line.  End with CNTL/Z.
   cBR8(config)#username cisco privilege 15 password 0 cisco
   cBR8(config)#enable secret cisco
   cBR8(config)#line vty 0 15
   cBR8(config)#login local
   cBR8(config)#exec-timeout 0 0
   cBR8(config)#session-timeout 0
   cBR8(config)#exit
   ```

3. If SSH is not enabled, use following CLI to enable SSH on cBR8, skip the domain name configuration if already configured.

   ```
   cBR8(config)# ip domain-name domain.com
   cBR8(config)#crypto key generate rsa
   The name for the keys will be: cbr8.domain.com
   Choose the size of the key modulus in the range of 360 to 4096 for your
   General Purpose Keys. Choosing a key modulus greater than 512 may take
   a few minutes.

   How many bits in the modulus [512]: 1024
   % Generating 1024 bit RSA keys, keys will be non-exportable...
   [OK] (elapsed time was 0 seconds)

   cBR8(config)#end
   cBR8#copy running-config startup-config
   cBR8#show ip ssh
   SSH Enabled - version 1.99
   ```

4. Check if there is enough bootflash disk space on both SUP (>1.8GB).

5. Verify if the Ansible server can access cBR-8 using SSH.

   ```
   [ansible@server ~]$ ssh cisco@100.0.0.1
   The authenticity of host '100.0.0.1 (100.0.0.1)' can't be established.
   RSA key fingerprint is c3:be:8f:cf:76:f4:31:4b:80:d8:2e:f0:76:6d:ff:bf.
   Are you sure you want to continue connecting (yes/no)? yes
   Warning: Permanently added '100.0.0.1' (RSA) to the list of known hosts.
   Password:
   cBR8#
   ```

6. Download three files from the following Cisco.com Software Center URL:

   https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

   - IOS XE Software Version 16.7.1b: **cbrsup-universalk9.16.07.01b.SPA.bin**

   - IOS XE Hardware Programmable Devices Version 16.7.1:
     cbrsup-programmable_firmware.16.07.01_compat_with_3.18SP.SSA.pkg

   - Ansible upgrade script: **cbr-8_upgrade_ansible_16.7.1a.tar**

7. Copy IOS XE Software package and IOS XE Hardware Programmable Devices package to TFTP/FTP/SCP server or usb disk. Upload Ansible upgrade script to Ansible server.

8. Console access for both SUPs are required.

9. Ability to power cycle the chassis. Power cycle chassis is required to upgrade Supervisor CPLD.

Step 1 Run following CLI on the Ansible server to create the docker image.

```
docker import cbr-8_upgrade_ansible_16.7.1a.tar ansible_mop
```

Step 2 Start docker container with the image and enter the container shell.

```
docker run -it --name=mop ansible_mop /bin/bash
```

Step 3 Change current directory to the playbook folder for this software and firmware upgrade.

```
cd /opt/cbr-8_upgrade_ansible_3.18sp_to_16.7.1a
```

Step 4 Modify hosts file to add target cBR-8 ip addresses, can be multiple lines if customer wants to upgrade firmware on multiple cBR8 routers simultaneously, sample file is as below:

```
[cbr]
100.110.110.110
100.185.185.185
```

Step 5 Modify secrets.yaml file, change the username/password/enable password to reflect the real username/password/enable configuration for target cBR. If no enable password is set, just keep the sample **cisco** for **auth_pass**.

```
creds:
  username: cisco
  password: cisco
  auth_pass: cisco
```

Step 6 Modify upgrade_vars.yaml file to indicate the firmware package name, ios image name and source (Optional if the package files are already on cbr-8 harddisk:).

```
file_info:
  image_name: cbrsup-universalk9.16.07.01b.SPA.bin
  pkg_name: cbrsup-programmable_firmware.16.07.01_compat_with_3.18SP.SSA.pkg
  #if the pkg file in the TB, just modify dst_dir to the pkg location
  #the four examples shows the usage
  #example1
  #src_dir: "ftp://username:password@20.11.0.42:~/"
  #example2
  #src_dir: "tftp://192.168.3.47/ "
  #example3
  #src_dir: "usb0:"
  #example4
  src_dir: "harddisk:"

slot_info:
  #slot_to_upgrade: [2,3,6,7,8,9]
  slot_to_upgrade: "ALL"
```

Step 7 Modify md5_map.yaml file in the folder **version_file** to add new image label and md5 value.

```
pkg_md5:
  cbrsup-programmable_firmware.16.07.01_compat_with_3.18SP.SSA.pkg: 292e26e20b038147f3443a5977415465
image_md5:
  cbrsup-universalk9.16.07.01b.SPA.bin: 1bc67f5266665043bd9336cacad1bac6
```

Step 8 Execute following command to start the playbook to upgrade firmware.

`./run_mop_upgrade`

Step 9 Reload the system by typing **reload** on the active SUP and answering **no** to not save the configuration.

```
cBR8#reload
System configuration has been modified. Save? [yes/no]: no
Proceed with reload? [confirm]
cBR8#
```

Step 10 From ROMMON issue the following command on both SUPs.

```
rommon 1 > confreg 0x2102
rommon 2 > sync
rommon 3 >
```

Step 11 Power cycle chassis, wait for both SUPs to auto boot to 16.7.1b image.

```
rommon 1>
Initializing Hardware ...

?

System Bootstrap, Version 16.6(2r)S, RELEASE SOFTWARE
Copyright (c) 1994-2016  by cisco Systems, Inc.

Current image running: Boot ROM1

Last reset cause: PowerOn

Viper version register: 0x16052011
Set Chassis Type to 13RU
Cisco cBR-8  platform with 50331648 Kbytes of main memory
```

Step 12 After system bootup and stable, execute following command to start the playbook to check the upgrade result.

```
./run_mop_upgrade_post

…
TASK [debug] ********************************************************
Friday 17 March 2017  14:30:25 +0800 (0:00:00.014)       0:01:10.187 **********
ok: [100.185.185.185] => {
    "msg": "Mop upgrade passed!"
}
PLAY RECAP *********************************************************
100.185.185.185              : ok=120  changed=1    unreachable=0    failed=0
```

Step 13   Exit the container if finished upgrading this time to stop the container.

```
exit
```

Step 14   If user wants to start the container again, use following command to start the container and enter its shell.

```
docker start mop
docker attach mop
```

Step 15   All the file changes are kept in the container, user can run step 4-11 to upgrade again.

Upgrading from Cisco IOS XE Everest 16.x to Cisco IOS XE Fuji 16.7.1b

The correct firmware versions are listed in the tables below. Use the commands in the tables to verify the firmware versions.

Table 3: Firmware Versions

Internal Name	Component Name	Correct Version	Command
Supervisor CPLD	CBR-CCAP-SUP-160G Rommon CPLD	16052011	**show platform**
Supervisor ROMMON	CBR-CCAP-SUP-160G Rommon	16.6(1r)S	**show platform**
Linecard CPLD	CBR-CCAP-LC-40G CPLD	00000025	**show platform**
Linecard Uboot	CBR-CCAP-LC-40G Rommon	2011.03.18	**show platform**
Linecard PSOC	CBR-CCAP-LC-40G PSOC	4.6	**show platform diag**
Docsis 3.0 downstream module PSOC	CBR-CCAP-LC-40G Gemin1 PSOC	3.9	**show platform diag**
Docsis 3.0 downstream module CPLD	CBR-CCAP-LC-40G Gemini1 CPLD	0.7	**show platform diag**

Docsis 3.0 downstream module Micro	CBR-CCAP-LC-40G Gemin1 Micro	1.E	**show platform diag**
Docsis 3.0 downstream module FPGA	CBR-CCAP-LC-40G Gemini1 Apollo	2.F	**show platform diag**
Docsis 3.1 downstream module PSOC	CBR-CCAP-LC-40G Gemin2 PSOC	4.4	**show platform diag**
Docsis 3.1 downstream module CPLD	CBR-CCAP-LC-40G Gemini2 CPLD	0.7	**show platform diag**
Docsis 3.1 downstream module Micro	CBR-CCAP-LC-40G Gemin2 Micro	3.1A	**show platform diag**
Docsis 3.1 downstream module FPGA	CBR-CCAP-LC-40G Gemini2 Apollo	4.484B	**show platform diag**

Upgrading Manually

Before you begin

Before upgrading the system, make sure the following requirements are met:

- Download two files from the following Cisco.com Software Center URL:

    https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

    - IOS XE Software Version 16.7.1b: **cbrsup-universalk9.16.07.01b.SPA.bin**

    - IOS XE Hardware Programmable Devices Version 16.7.1: **cbrsup-programmable_firmware.16.07.01.SPA.pkg**

- Console access for both SUPs are required.

✎

Note   Do not power cycle the cBR-8 router during the firmware upgrade process. Power cycling the chassis may corrupt the ROMMON/Uboot image.

Step 1   Copy Cisco IOS-XE Fuji 16.7.1b package to bootflash: and stby-bootflash:.

```
copy <location>/cbrsup-universalk9.16.07.01b.SPA.bin bootflash:
```

```
copy <location>/cbrsup-universalk9.16.07.01b.SPA.bin stby-bootflash:
```

Step 2   Verify Cisco IOS-XE Fuji 16.7.1b package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 bootflash:cbrsup-universalk9.16.07.01b.SPA.bin
verify /md5 stby-bootflash:cbrsup-universalk9.16.07.01b.SPA.bin
```

Step 3   Copy the hardware programmable devices upgrade package to harddisk: and stby-harddisk:.

```
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg harddisk:
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg stby-harddisk:
```

Step 4   Verify the hardware programmable devices upgrade package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
verify /md5 stby-harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 5   Check system status prior to upgrade. Save the information to compare against the system status after upgrade. For the commands to use to check the status, see the **show** commands at the end of this section.

Step 6   Configure the chassis to boot the system with Cisco IOS-XE Fuji 16.7.1b image.

```
Configure terminal
no boot system
boot system bootflash:cbrsup-universalk9.16.07.01b.SPA.bin
end
write mem
```

Step 7   Reload the cBR-8 router.

```
Reload
```

Note   The system will reload twice.

Step 8   Remove the secondary line card from line card redundancy group if redundancy is configured.

```
Configure terminal
redundancy
linecard-group 0 internal-switch
no member slot 0 secondary
end
```

Step 9   Upgrade Docsis 3.1 downstream modules in all the slots.

```
upgrade hw-programmable cable <slot> dsphy micro
pkg_name/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 10   Wait for the system log message asking the user to reload the line card that was upgraded.

```
001860: Jun 15 19:05:05.904 PDT: %IOSXE-5-PLATFORM: CLC0: cdman: Suggest reload the line card for
new FW to take effect using CLI: hw slot <slot-id> reload
```

Step 11   Reload Docsis 3.1 downstream modules in all the slots.

```
hw slot <slot> reload
```

Step 12   Add secondary line card into line card redundancy group.

```
configure terminal
redundancy
linecard-group 0 internal-switch
member slot 0 secondary
end
```

What to do next

Perform verification test to determine if the upgrade is successful, include:

- Verify the router is running the new IOS-XE release using **show version** command.

- Check facility alarms using **show facility-alarm status** command.

- Check the status of the power supplies using **show environment power** command.

- Check PS status using **show platform hardware slot P<0-5> mcu status** command.

- Complete trace routes to known good off-network IP address using the source address of customer CPE blocks to verify routing is working.

- Check logs for error messages using **show log** command.

These **show** commands may be useful in the verification test:

- **show redundancy**

- **show platform**

- **show platform diag**

- **show environment**

- **show redundancy linecard all**

- **show isis neighbors**

- **show ip ospf neighbor**

- **show ip route rip**

- **show ip mroute**

- **show cops servers**

- **show cable modem voice**

- **show cable calls**

- **show cable metering verbose**

- **show cable licenses all**

- **show inventory**

Upgrading with Ansible

Before you begin

Before upgrading the firmware, make sure the following requirements are met:

1. Prepare Ansible Server, operating system can be Linux/Windows/Mac, with docker service pre-installed.

   For docker installation guide, please check following link:

   https://docs.docker.com/engine/installation/

2. Check if the chassis supports AAA or local authentication with username & password. If not configured, use following CLI to enable local authentication, for example:

   ```
   Cbr8#configure terminal
   Enter configuration commands, one per line.  End with CNTL/Z.
   cBR8(config)#username cisco privilege 15 password 0 cisco
   cBR8(config)#enable secret cisco
   cBR8(config)#line vty 0 15
   cBR8(config)#login local
   cBR8(config)#exec-timeout 0 0
   cBR8(config)#session-timeout 0
   cBR8(config)#exit
   ```

3. If SSH is not enabled, use following CLI to enable SSH on cBR8, skip the domain name configuration if already configured.

   ```
   cBR8(config)# ip domain-name domain.com
   cBR8(config)#crypto key generate rsa
   The name for the keys will be: cbr8.domain.com
   Choose the size of the key modulus in the range of 360 to 4096 for your
   General Purpose Keys. Choosing a key modulus greater than 512 may take
   a few minutes.

   How many bits in the modulus [512]: 1024
   % Generating 1024 bit RSA keys, keys will be non-exportable...
   [OK] (elapsed time was 0 seconds)

   cBR8(config)#end
   cBR8#copy running-config startup-config
   cBR8#show ip ssh
   SSH Enabled - version 1.99
   ```

4. Check if there is enough bootflash disk space on both SUP (>1.8GB).

5. Verify if the Ansible server can access cBR-8 using SSH.

   ```
   [ansible@server ~]$ ssh cisco@100.0.0.1
   The authenticity of host '100.0.0.1 (100.0.0.1)' can't be established.
   RSA key fingerprint is c3:be:8f:cf:76:f4:31:4b:80:d8:2e:f0:76:6d:ff:bf.
   Are you sure you want to continue connecting (yes/no)? yes
   ```

```
Warning: Permanently added '100.0.0.1' (RSA) to the list of known hosts.
Password:
cBR8#
```

6. Download three files from the following Cisco.com Software Center URL:

   https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

   - IOS XE Software Version 16.7.1b: **cbrsup-universalk9.16.07.01b.SPA.bin**

   - IOS XE Hardware Programmable Devices Version 16.7.1:
     cbrsup-programmable_firmware.16.07.01.SPA.pkg

   - Ansible upgrade script: **cbr-8_upgrade_ansible_16.7.1a.tar**

7. Copy IOS XE Software package and IOS XE Hardware Programmable Devices package to TFTP/FTP/SCP server or usb disk. Upload Ansible upgrade script to Ansible server.

8. Console access for both SUPs are required.

9. Ability to power cycle the chassis. Power cycle chassis is required to upgrade Supervisor CPLD.

Step 1 Run following CLI on the Ansible server to create the docker image.

```
docker import cbr-8_upgrade_ansible_16.7.1a.tar ansible_mop
```

Step 2 Start docker container with the image and enter the container shell.

```
docker run -it --name=mop ansible_mop /bin/bash
```

Step 3 Change current directory to the playbook folder for this software and firmware upgrade.

```
cd /opt/cbr-8_upgrade_ansible_16.x_to_16.7.1a
```

Step 4 Modify hosts file to add target cBR-8 ip addresses, can be multiple lines if customer wants to upgrade firmware on multiple cBR8 routers simultaneously, sample file is as below:

```
[cbr]
100.110.110.110
100.185.185.185
```

Step 5 Modify secrets.yaml file, change the username/password/enable password to reflect the real username/password/enable configuration for target cBR. If no enable password is set, just keep the sample **cisco** for **auth_pass**.

```
creds:
  username: cisco
  password: cisco
  auth_pass: cisco
```

Step 6 Modify upgrade_vars.yaml file to indicate the firmware package name, ios image name and source (Optional if the package files are already on cbr-8 harddisk:).

```
file_info:
  image_name: cbrsup-universalk9.16.07.01b.SPA.bin
  pkg_name: cbrsup-programmable_firmware.16.07.01.SPA.pkg
  #if the pkg file in the TB, just modify dst_dir to the pkg location
  #the four examples shows the usage
  #example1
  #src_dir: "ftp://username:password@20.11.0.42:~/"
  #example2
  #src_dir: "tftp://192.168.3.47/ "
  #example3
  #src_dir: "usb0:"
  #example4
  src_dir: "harddisk:"

slot_info:
  #slot_to_upgrade: [2,3,6,7,8,9]
  slot_to_upgrade: "ALL"
```

Step 7   Modify md5_map.yaml file in the folder **version_file** to add new image label and md5 value.

```
pkg_md5:
  cbrsup-programmable_firmware.16.07.01.SPA.pkg: c99c25ae470364b905369efaec30c1f0
image_md5:
  cbrsup-universalk9.16.07.01b.SPA.bin: 1bc67f5266665043bd9336cacad1bac6
```

Step 8   Execute following command to start the playbook to upgrade firmware.

`./run_mop_upgrade`

Step 9   Exit the container if finished upgrading this time to stop the container.

`exit`

Step 10   If user wants to start the container again, use following command to start the container and enter its shell.

`docker start mop`
`docker attach mop`

Step 11   All the file changes are kept in the container, user can run step 4-11 to upgrade again.

Upgrading from Cisco IOS XE Everest 16.6.1 to Cisco IOS XE Fuji 16.7.1b with ISSU

The correct firmware versions are listed in the tables below. Use the commands in the tables to verify the firmware versions.

Table 4: Firmware Versions

Internal Name	Component Name	Correct Version	Command
Supervisor CPLD	CBR-CCAP-SUP-160G Rommon CPLD	16052011	**show platform**
Supervisor ROMMON	CBR-CCAP-SUP-160G Rommon	16.6(1r)S	**show platform**
Linecard CPLD	CBR-CCAP-LC-40G CPLD	00000025	**show platform**
Linecard Uboot	CBR-CCAP-LC-40G Rommon	2011.03.18	**show platform**
Linecard PSOC	CBR-CCAP-LC-40G PSOC	4.6	**show platform diag**
Docsis 3.0 downstream module PSOC	CBR-CCAP-LC-40G Gemin1 PSOC	3.9	**show platform diag**
Docsis 3.0 downstream module CPLD	CBR-CCAP-LC-40G Gemini1 CPLD	0.7	**show platform diag**
Docsis 3.0 downstream module Micro	CBR-CCAP-LC-40G Gemin1 Micro	1.E	**show platform diag**
Docsis 3.0 downstream module FPGA	CBR-CCAP-LC-40G Gemini1 Apollo	2.F	**show platform diag**
Docsis 3.1 downstream module PSOC	CBR-CCAP-LC-40G Gemin2 PSOC	4.4	**show platform diag**
Docsis 3.1 downstream module CPLD	CBR-CCAP-LC-40G Gemini2 CPLD	0.7	**show platform diag**
Docsis 3.1 downstream module Micro	CBR-CCAP-LC-40G Gemin2 Micro	3.1A	**show platform diag**
Docsis 3.1 downstream module FPGA	CBR-CCAP-LC-40G Gemini2 Apollo	4.484B	**show platform diag**

Before you begin

Before upgrading the system, make sure the following requirements are met:

- Download two files from the following Cisco.com Software Center URL:

  https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

  - IOS XE Software Version 16.7.1b: **cbrsup-universalk9.16.07.01b.SPA.bin**

  - IOS XE Hardware Programmable Devices Version 16.7.1:
    cbrsup-programmable_firmware.16.07.01.SPA.pkg

Note　Do not power cycle the cBR-8 router during the firmware upgrade process. Power cycling the chassis may corrupt the ROMMON/Uboot image.

Step 1　Copy Cisco IOS-XE Fuji 16.7.1b package to bootflash: and stby-bootflash:.

```
copy <location>/cbrsup-universalk9.16.07.01b.SPA.bin bootflash:
copy <location>/cbrsup-universalk9.16.07.01b.SPA.bin stby-bootflash:
```

Step 2　Verify Cisco IOS-XE Fuji 16.7.1b package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 bootflash:cbrsup-universalk9.16.07.01b.SPA.bin
verify /md5 stby-bootflash:cbrsup-universalk9.16.07.01b.SPA.bin
```

Step 3　Copy the hardware programmable devices upgrade package to harddisk: and stby-harddisk:.

```
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg harddisk:
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg stby-harddisk:
```

Step 4　Verify the hardware programmable devices upgrade package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
verify /md5 stby-harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 5　Check system status prior to upgrade. Save the information to compare against the system status after upgrade. For the commands to use to check the status, see the **show** commands at the end of this section.

Step 6　Upgrade Docsis 3.1 downstream modules in all the slots.

```
upgrade hw-programmable cable <slot> dsphy micro
pkg_name/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 7　Wait for the system log message asking the user to reload the line card that was upgraded.

```
001860: Jun 15 19:05:05.904 PDT: %IOSXE-5-PLATFORM: CLC0: cdman: Suggest reload the line card for
new FW to take effect using CLI: hw slot <slot-id> reload
```

Step 8   Before the ISSU upgrade please check and make sure:

- The cBR-8 is in Subpackage mode.

- Both SUPs are running same image from same path.

- Autoboot is enabled.

- The cBR-8 has two SUP and in SSO mode, standby SUP is in standby hot mode.

- All linecards are in normal state in LCHA group. Use **show redundancy linecard all** command, active cards should be in **Stdby Warm** state.

- There is enough bootflash disk space on both SUP.

Step 9   Copy 16.7.1b image in the same folder of current boot package on active SUP.

Step 10   Make sure .issu folder and config files exists on both active and standby SUP harddisk. If no such folder exists or files missing, create a new one and generate files needed.

Step 11   Perform ISSU.

```
request platform software package install node file bootflash:cbrsup-universalk9.16.07.01b.SPA.bin
```

Step 12   To monitor the ISSU progress, use the command below.

```
request platform software package install node attach
```

Step 13   Use these CLI to check status after ISSU.

```
show version
show version r0 running
show version r1 running
show version r0 provisioned
show version r1 provisioned
```

Note If both Docsis 3.1 OFDM channels and downstream load balancing are configured, then Docsis 3.1 CMs will come up in a Docsis 3.0 bonding group after ISSU from Cisco IOS XE Everest 16.6.x. The workaround procedure is:

a. Admin shut all OFDM channels. This can be done from a script, or from cut and paste of the CLI. There is no need to have a delay between successive shuts. For example:

```
configure terminal
    controller Integrated-Cable 2/0/0
        rf-chan 158
            shut
end
```

b. Wait for 30 seconds.

c. Admin perform no-shut on all OFDM channels. This may be done from a script, or from cut and paste of the CLI. There is no need to have a delay between successive no-shuts. For example:

```
configure terminal
    controller Integrated-Cable 2/0/0
        rf-chan 158
            no shut
end
```

d. Reset all Docsis 31 CMs. For example:

```
clear cable modem d31-capable reset
```

What to do next

Perform verification test to determine if the upgrade is successful, include:

- Verify the router is running the new IOS-XE release using **show version** command.

- Check facility alarms using **show facility-alarm status** command.

- Check the status of the power supplies using **show environment power** command.

- Check PS status using **show platform hardware slot P<0-5> mcu status** command.

- Complete trace routes to known good off-network IP address using the source address of customer CPE blocks to verify routing is working.

- Check logs for error messages using **show log** command.

These **show** commands may be useful in the verification test:

- **show redundancy**

- **show platform**

- **show platform diag**

- **show environment**

- **show redundancy linecard all**

- **show isis neighbors**

- **show ip ospf neighbor**

- **show ip route rip**

- **show ip mroute**

- **show cops servers**

- **show cable modem voice**

- **show cable calls**

- **show cable metering verbose**

- **show cable licenses all**

- **show inventory**

C H A P T E R 3

Upgrading the Cisco cBR-8 Router System to Cisco IOS XE Fuji 16.7.1a

This section contains the upgrade procedures for the Cisco cBR-8 Router System.

Upgrading from Cisco IOS-XE 3.18.1aSP to Cisco IOS XE Fuji 16.7.1a

The correct firmware versions are listed in the tables below. Use the commands in the tables to verify the firmware versions.

Table 5: Firmware Versions

Internal Name	Component Name	Correct Version	Command
Supervisor CPLD	CBR-CCAP-SUP-160G Rommon CPLD	16052011	**show platform**
Supervisor ROMMON	CBR-CCAP-SUP-160G Rommon	16.6(1r)S	**show platform**
Linecard CPLD	CBR-CCAP-LC-40G CPLD	00000025	**show platform**
Linecard Uboot	CBR-CCAP-LC-40G Rommon	2011.03.18	**show platform**
Linecard PSOC	CBR-CCAP-LC-40G PSOC	4.6	**show platform diag**
Docsis 3.0 downstream module PSOC	CBR-CCAP-LC-40G Gemin1 PSOC	3.9	**show platform diag**

Docsis 3.0 downstream module CPLD	CBR-CCAP-LC-40G Gemini1 CPLD	0.7	**show platform diag**
Docsis 3.0 downstream module Micro	CBR-CCAP-LC-40G Gemin1 Micro	1.E	**show platform diag**
Docsis 3.0 downstream module FPGA	CBR-CCAP-LC-40G Gemini1 Apollo	2.F	**show platform diag**
Docsis 3.1 downstream module PSOC	CBR-CCAP-LC-40G Gemin2 PSOC	4.4	**show platform diag**
Docsis 3.1 downstream module CPLD	CBR-CCAP-LC-40G Gemini2 CPLD	0.7	**show platform diag**
Docsis 3.1 downstream module Micro	CBR-CCAP-LC-40G Gemin2 Micro	3.1A	**show platform diag**
Docsis 3.1 downstream module FPGA	CBR-CCAP-LC-40G Gemini2 Apollo	4.484B	**show platform diag**
RF-PIC Firmware	CBR-RF-PIC	00000746	**show platform diag**
RF-PROT-PIC Firmware	CBR-RF-PROT-PIC	0000071E	**show platform diag**

Upgrading Manually

Before you begin

Before upgrading the system, make sure the following requirements are met:

- The firmware versions are not lower than the ones listed in Firmware versions table. Otherwise upgrade the firmware versions, see Upgrading the Cisco cBR-8 Router Firmware.

- Make sure Line Card CPLD version is 00000025. If the value is lower than 00000025, follow this procedure to upgrade the Line Card CPLD to version 00000025 first:

  http://www.cisco.com/c/en/us/td/docs/cable/cbr/upgrade/guide/b_cbr_upgrade-3-18s/b_cbr_upgrade_hardware.html#task_E0B78DCCC88A41749DA2783736CE37A6

- Download two files from the following Cisco.com Software Center URL:

  https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

    - IOS XE Software Version 16.7.1a: **cbrsup-universalk9.16.07.01a.SPA.bin**

      • IOS XE Hardware Programmable Devices Version 16.7.1:
         cbrsup-programmable_firmware.16.07.01.SPA.pkg

• Console access for both SUPs are required.

• Ability to power cycle the chassis. Power cycle chassis is required to upgrade Supervisor CPLD.

Note   Do not power cycle the cBR-8 router during the firmware upgrade process. Power cycling the chassis may corrupt the ROMMON/Uboot image.

Step 1   Copy Cisco IOS-XE Fuji 16.7.1a package to bootflash: and stby-bootflash:.

```
copy <location>/cbrsup-universalk9.16.07.01a.SPA.bin bootflash:
copy <location>/cbrsup-universalk9.16.07.01a.SPA.bin stby-bootflash:
```

Step 2   Verify Cisco IOS-XE Fuji 16.7.1a package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 bootflash:cbrsup-universalk9.16.07.01a.SPA.bin
verify /md5 stby-bootflash:cbrsup-universalk9.16.07.01a.SPA.bin
```

Step 3   Copy the hardware programmable devices upgrade package to harddisk: and stby-harddisk:.

```
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg harddisk:
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg stby-harddisk:
```

Step 4   Verify the hardware programmable devices upgrade package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
verify /md5 stby-harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 5   Check system status prior to upgrade. Save the information to compare against the system status after upgrade. For the commands to use to check the status, see the **show** commands at the end of this section.

Step 6   Configure the chassis to boot the system with Cisco IOS-XE Fuji 16.7.1a image.

```
Configure terminal
no boot system
boot system bootflash:cbrsup-universalk9.16.07.01a.SPA.bin
end
write mem
```

Step 7   Reload the cBR-8 router.

```
Reload
```

Note   The system will reload twice.

Step 8   Remove the secondary line card from line card redundancy group if redundancy is configured.

```
Configure terminal
redundancy
linecard-group 0 internal-switch
no member slot 0 secondary
end
```

Step 9   Configure config-register to manual boot.

```
Configure terminal
config-register 0x0
end
```

Step 10   Upgrade Docsis 3.1 downstream modules in all the slots.

```
upgrade hw-programmable cable <slot> dsphy auto
pkg_name/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 11   Upgrade Supervisor 0/1 CPLD.

```
upgrade hw-programmable cable r0 viper pkg_name
/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
upgrade hw-programmable cable r1 viper pkg_name
/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 12   Make sure the line card Docsis 3.1 downstream modules upgrade has completed successfully by examining the system log:

```
Show logging | include slot-id
001860: Jun 15 19:05:05.904 PDT: %IOSXE-5-PLATFORM: CLC0: cdman: Suggest reload the line card for
new FW to take effect using CLI: hw slot <slot-id> reload
```

Step 13   Reload the cBR-8 router. Answer **no** to not save the configuration.

```
cBR8#reload
System configuration has been modified. Save? [yes/no]: no
Proceed with reload? [confirm]
cBR8#
```

Step 14   Configure to automatic boot by typing following command in **rommon >** prompt.

```
rommon 1 > confreg 0x2102
rommon 2 > sync
rommon 3 >
```

Step 15   Power cycle chassis, wait for both SUPs to auto boot to 16.7.1a image.

What to do next

Perform verification test to determine if the upgrade is successful, include:

- Verify the router is running the new IOS-XE release using **show version** command.

- Check facility alarms using **show facility-alarm status** command.

- Check the status of the power supplies using **show environment power** command.

- Check PS status using **show platform hardware slot P<0-5> mcu status** command.

- Complete trace routes to known good off-network IP address using the source address of customer CPE blocks to verify routing is working.

- Check logs for error messages using **show log** command.

These **show** commands may be useful in the verification test:

- **show redundancy**

- **show platform**

- **show platform diag**

- **show environment**

- **show redundancy linecard all**

- **show isis neighbors**

- **show ip ospf neighbor**

- **show ip route rip**

- **show ip mroute**

- **show cops servers**

- **show cable modem voice**

- **show cable calls**

- **show cable metering verbose**

- **show cable licenses all**

- **show inventory**

Upgrading with Ansible

Before you begin

Before upgrading the firmware, make sure the following requirements are met:

1. Prepare Ansible Server, operating system can be Linux/Windows/Mac, with docker service pre-installed.

    For docker installation guide, please check following link:

    https://docs.docker.com/engine/installation/

2. Check if the chassis supports AAA or local authentication with username & password. If not configured, use following CLI to enable local authentication, for example:

    ```
    Cbr8#configure terminal
    Enter configuration commands, one per line.  End with CNTL/Z.
    cBR8(config)#username cisco privilege 15 password 0 cisco
    cBR8(config)#enable secret cisco
    cBR8(config)#line vty 0 15
    cBR8(config)#login local
    cBR8(config)#exec-timeout 0 0
    cBR8(config)#session-timeout 0
    cBR8(config)#exit
    ```

3. If SSH is not enabled, use following CLI to enable SSH on cBR8, skip the domain name configuration if already configured.

    ```
    cBR8(config)# ip domain-name domain.com
    cBR8(config)#crypto key generate rsa
    The name for the keys will be: cbr8.domain.com
    Choose the size of the key modulus in the range of 360 to 4096 for your
    General Purpose Keys. Choosing a key modulus greater than 512 may take
    a few minutes.

    How many bits in the modulus [512]: 1024
    % Generating 1024 bit RSA keys, keys will be non-exportable...
    [OK] (elapsed time was 0 seconds)

    cBR8(config)#end
    cBR8#copy running-config startup-config
    cBR8#show ip ssh
    SSH Enabled - version 1.99
    ```

4. Check if there is enough bootflash disk space on both SUP (>1.8GB).

5. Verify if the Ansible server can access cBR-8 using SSH.

    ```
    [ansible@server ~]$ ssh cisco@100.0.0.1
    The authenticity of host '100.0.0.1 (100.0.0.1)' can't be established.
    RSA key fingerprint is c3:be:8f:cf:76:f4:31:4b:80:d8:2e:f0:76:6d:ff:bf.
    Are you sure you want to continue connecting (yes/no)? yes
    Warning: Permanently added '100.0.0.1' (RSA) to the list of known hosts.
    Password:
    cBR8#
    ```

6. Download three files from the following Cisco.com Software Center URL:

    https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

    - IOS XE Software Version 16.7.1a: **cbrsup-universalk9.16.07.01a.SPA.bin**

    - IOS XE Hardware Programmable Devices Version 16.7.1:
      cbrsup-programmable_firmware.16.07.01_compat_with_3.18SP.SSA.pkg

    - Ansible upgrade script: **cbr-8_upgrade_ansible_16.7.1a.tar**

7. Copy IOS XE Software package and IOS XE Hardware Programmable Devices package to TFTP/FTP/SCP server or usb disk. Upload Ansible upgrade script to Ansible server.

8. Console access for both SUPs are required.

9. Ability to power cycle the chassis. Power cycle chassis is required to upgrade Supervisor CPLD.

Step 1 Run following CLI on the Ansible server to create the docker image.

```
docker import cbr-8_upgrade_ansible_16.7.1a.tar ansible_mop
```

Step 2 Start docker container with the image and enter the container shell.

```
docker run -it --name=mop ansible_mop /bin/bash
```

Step 3 Change current directory to the playbook folder for this software and firmware upgrade.

```
cd /opt/cbr-8_upgrade_ansible_3.18sp_to_16.7.1a
```

Step 4 Modify hosts file to add target cBR-8 ip addresses, can be multiple lines if customer wants to upgrade firmware on multiple cBR8 routers simultaneously, sample file is as below:

```
[cbr]
100.110.110.110
100.185.185.185
```

Step 5 Modify secrets.yaml file, change the username/password/enable password to reflect the real username/password/enable configuration for target cBR. If no enable password is set, just keep the sample **cisco** for **auth_pass**.

```
creds:
  username: cisco
  password: cisco
  auth_pass: cisco
```

Step 6 Modify upgrade_vars.yaml file to indicate the firmware package name, ios image name and source (Optional if the package files are already on cbr-8 harddisk:).

```
file_info:
  image_name: cbrsup-universalk9.16.07.01a.SPA.bin
  pkg_name: cbrsup-programmable_firmware.16.07.01_compat_with_3.18SP.SSA.pkg
  #if the pkg file in the TB, just modify dst_dir to the pkg location
  #the four examples shows the usage
  #example1
  #src_dir: "ftp://username:password@20.11.0.42:~/"
  #example2
  #src_dir: "tftp://192.168.3.47/ "
  #example3
  #src_dir: "usb0:"
  #example4
  src_dir: "harddisk:"

slot_info:
  #slot_to_upgrade: [2,3,6,7,8,9]
  slot_to_upgrade: "ALL"
```

Step 7 Execute following command to start the playbook to upgrade firmware.

./run_mop_upgrade

Step 8 Reload the system by typing **reload** on the active SUP and answering **no** to not save the configuration.

```
cBR8#reload
System configuration has been modified. Save? [yes/no]: no
Proceed with reload? [confirm]
cBR8#
```

Step 9 From ROMMON issue the following command on both SUPs.

```
rommon 1 > confreg 0x2102
rommon 2 > sync
rommon 3 >
```

Step 10 Power cycle chassis, wait for both SUPs to auto boot to 16.7.1a image.

```
rommon 1>
Initializing Hardware ...

?

System Bootstrap, Version 16.6(2r)S, RELEASE SOFTWARE
Copyright (c) 1994-2016  by cisco Systems, Inc.

Current image running: Boot ROM1

Last reset cause: PowerOn

Viper version register: 0x16052011
Set Chassis Type to 13RU
Cisco cBR-8  platform with 50331648 Kbytes of main memory
```

Step 11 After system bootup and stable, execute following command to start the playbook to check the upgrade result.

```
./run_mop_upgrade_post

…
TASK [debug] ****************************************************************
Friday 17 March 2017  14:30:25 +0800 (0:00:00.014)        0:01:10.187 **********
ok: [100.185.185.185] => {
    "msg": "Mop upgrade passed!"
}
PLAY RECAP *****************************************************************
100.185.185.185            : ok=120   changed=1    unreachable=0    failed=0
```

Step 12 Exit the container if finished upgrading this time to stop the container.

exit

Step 13 If user wants to start the container again, use following command to start the container and enter its shell.

```
docker start mop
docker attach mop
```

Step 14 All the file changes are kept in the container, user can run step 4-11 to upgrade again.

Upgrading from Cisco IOS XE Everest 16.x to Cisco IOS XE Fuji 16.7.1a

The correct firmware versions are listed in the tables below. Use the commands in the tables to verify the firmware versions.

Table 6: Firmware Versions

Internal Name	Component Name	Correct Version	Command
Supervisor CPLD	CBR-CCAP-SUP-160G Rommon CPLD	16052011	**show platform**
Supervisor ROMMON	CBR-CCAP-SUP-160G Rommon	16.6(1r)S	**show platform**
Linecard CPLD	CBR-CCAP-LC-40G CPLD	00000025	**show platform**
Linecard Uboot	CBR-CCAP-LC-40G Rommon	2011.03.18	**show platform**
Linecard PSOC	CBR-CCAP-LC-40G PSOC	4.6	**show platform diag**
Docsis 3.0 downstream module PSOC	CBR-CCAP-LC-40G Gemin1 PSOC	3.9	**show platform diag**
Docsis 3.0 downstream module CPLD	CBR-CCAP-LC-40G Gemini1 CPLD	0.7	**show platform diag**
Docsis 3.0 downstream module Micro	CBR-CCAP-LC-40G Gemin1 Micro	1.E	**show platform diag**
Docsis 3.0 downstream module FPGA	CBR-CCAP-LC-40G Gemini1 Apollo	2.F	**show platform diag**

Docsis 3.1 downstream module PSOC	CBR-CCAP-LC-40G Gemin2 PSOC	4.4	**show platform diag**
Docsis 3.1 downstream module CPLD	CBR-CCAP-LC-40G Gemini2 CPLD	0.7	**show platform diag**
Docsis 3.1 downstream module Micro	CBR-CCAP-LC-40G Gemin2 Micro	3.1A	**show platform diag**
Docsis 3.1 downstream module FPGA	CBR-CCAP-LC-40G Gemini2 Apollo	4.484B	**show platform diag**

Upgrading Manually

Before you begin

Before upgrading the system, make sure the following requirements are met:

- Download two files from the following Cisco.com Software Center URL:

  https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

  - IOS XE Software Version 16.7.1a: **cbrsup-universalk9.16.07.01a.SPA.bin**

  - IOS XE Hardware Programmable Devices Version 16.7.1: **cbrsup-programmable_firmware.16.07.01.SPA.pkg**

- Console access for both SUPs are required.

> **Note** Do not power cycle the cBR-8 router during the firmware upgrade process. Power cycling the chassis may corrupt the ROMMON/Uboot image.

Step 1   Copy Cisco IOS-XE Fuji 16.7.1a package to bootflash: and stby-bootflash:.

```
copy <location>/cbrsup-universalk9.16.07.01a.SPA.bin bootflash:
copy <location>/cbrsup-universalk9.16.07.01a.SPA.bin stby-bootflash:
```

Step 2   Verify Cisco IOS-XE Fuji 16.7.1a package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 bootflash:cbrsup-universalk9.16.07.01a.SPA.bin
verify /md5 stby-bootflash:cbrsup-universalk9.16.07.01a.SPA.bin
```

Step 3 Copy the hardware programmable devices upgrade package to harddisk: and stby-harddisk:.

```
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg harddisk:
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg stby-harddisk:
```

Step 4 Verify the hardware programmable devices upgrade package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
verify /md5 stby-harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 5 Check system status prior to upgrade. Save the information to compare against the system status after upgrade. For the commands to use to check the status, see the **show** commands at the end of this section.

Step 6 Configure the chassis to boot the system with Cisco IOS-XE Fuji 16.7.1a image.

```
Configure terminal
no boot system
boot system bootflash:cbrsup-universalk9.16.07.01a.SPA.bin
end
write mem
```

Step 7 Reload the cBR-8 router.

```
Reload
```

Note The system will reload twice.

Step 8 Remove the secondary line card from line card redundancy group if redundancy is configured.

```
Configure terminal
redundancy
linecard-group 0 internal-switch
no member slot 0 secondary
end
```

Step 9 Upgrade Docsis 3.1 downstream modules in all the slots.

```
upgrade hw-programmable cable <slot> dsphy micro
pkg_name/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 10 Wait for the system log message asking the user to reload the line card that was upgraded.

```
001860: Jun 15 19:05:05.904 PDT: %IOSXE-5-PLATFORM: CLC0: cdman: Suggest reload the line card for
new FW to take effect using CLI: hw slot <slot-id> reload
```

Step 11 Reload Docsis 3.1 downstream modules in all the slots.

```
hw slot <slot> reload
```

Step 12   Add secondary line card into line card redundancy group.

```
configure terminal
redundancy
linecard-group 0 internal-switch
member slot 0 secondary
end
```

What to do next

Perform verification test to determine if the upgrade is successful, include:

- Verify the router is running the new IOS-XE release using **show version** command.

- Check facility alarms using **show facility-alarm status** command.

- Check the status of the power supplies using **show environment power** command.

- Check PS status using **show platform hardware slot P<0-5> mcu status** command.

- Complete trace routes to known good off-network IP address using the source address of customer CPE blocks to verify routing is working.

- Check logs for error messages using **show log** command.

These **show** commands may be useful in the verification test:

- **show redundancy**

- **show platform**

- **show platform diag**

- **show environment**

- **show redundancy linecard all**

- **show isis neighbors**

- **show ip ospf neighbor**

- **show ip route rip**

- **show ip mroute**

- **show cops servers**

- **show cable modem voice**

- **show cable calls**

- **show cable metering verbose**

- **show cable licenses all**

- **show inventory**

Upgrading with Ansible

Before you begin

Before upgrading the firmware, make sure the following requirements are met:

1. Prepare Ansible Server, operating system can be Linux/Windows/Mac, with docker service pre-installed.

   For docker installation guide, please check following link:

   https://docs.docker.com/engine/installation/

2. Check if the chassis supports AAA or local authentication with username & password. If not configured, use following CLI to enable local authentication, for example:

   ```
   Cbr8#configure terminal
   Enter configuration commands, one per line.  End with CNTL/Z.
   cBR8(config)#username cisco privilege 15 password 0 cisco
   cBR8(config)#enable secret cisco
   cBR8(config)#line vty 0 15
   cBR8(config)#login local
   cBR8(config)#exec-timeout 0 0
   cBR8(config)#session-timeout 0
   cBR8(config)#exit
   ```

3. If SSH is not enabled, use following CLI to enable SSH on cBR8, skip the domain name configuration if already configured.

   ```
   cBR8(config)# ip domain-name domain.com
   cBR8(config)#crypto key generate rsa
   The name for the keys will be: cbr8.domain.com
   Choose the size of the key modulus in the range of 360 to 4096 for your
   General Purpose Keys. Choosing a key modulus greater than 512 may take
   a few minutes.

   How many bits in the modulus [512]: 1024
   % Generating 1024 bit RSA keys, keys will be non-exportable...
   [OK] (elapsed time was 0 seconds)

   cBR8(config)#end
   cBR8#copy running-config startup-config
   cBR8#show ip ssh
   SSH Enabled - version 1.99
   ```

4. Check if there is enough bootflash disk space on both SUP (>1.8GB).

5. Verify if the Ansible server can access cBR-8 using SSH.

   ```
   [ansible@server ~]$ ssh cisco@100.0.0.1
   The authenticity of host '100.0.0.1 (100.0.0.1)' can't be established.
   RSA key fingerprint is c3:be:8f:cf:76:f4:31:4b:80:d8:2e:f0:76:6d:ff:bf.
   Are you sure you want to continue connecting (yes/no)? yes
   Warning: Permanently added '100.0.0.1' (RSA) to the list of known hosts.
   Password:
   cBR8#
   ```

6. Download three files from the following Cisco.com Software Center URL:

   https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

   - IOS XE Software Version 16.7.1a: **cbrsup-universalk9.16.07.01a.SPA.bin**

      • IOS XE Hardware Programmable Devices Version 16.7.1:
       cbrsup-programmable_firmware.16.07.01.SPA.pkg

      • Ansible upgrade script: **cbr-8_upgrade_ansible_16.7.1a.tar**

7. Copy IOS XE Software package and IOS XE Hardware Programmable Devices package to TFTP/FTP/SCP server or usb disk. Upload Ansible upgrade script to Ansible server.

8. Console access for both SUPs are required.

9. Ability to power cycle the chassis. Power cycle chassis is required to upgrade Supervisor CPLD.

Step 1   Run following CLI on the Ansible server to create the docker image.

```
docker import cbr-8_upgrade_ansible_16.7.1a.tar ansible_mop
```

Step 2   Start docker container with the image and enter the container shell.

```
docker run -it --name=mop ansible_mop /bin/bash
```

Step 3   Change current directory to the playbook folder for this software and firmware upgrade.

```
cd /opt/cbr-8_upgrade_ansible_16.x_to_16.7.1a
```

Step 4   Modify hosts file to add target cBR-8 ip addresses, can be multiple lines if customer wants to upgrade firmware on multiple cBR8 routers simultaneously, sample file is as below:

```
[cbr]
100.110.110.110
100.185.185.185
```

Step 5   Modify secrets.yaml file, change the username/password/enable password to reflect the real username/password/enable configuration for target cBR. If no enable password is set, just keep the sample **cisco** for **auth_pass**.

```
creds:
  username: cisco
  password: cisco
  auth_pass: cisco
```

Step 6   Modify upgrade_vars.yaml file to indicate the firmware package name, ios image name and source (Optional if the package files are already on cbr-8 harddisk:).

```
file_info:
  image_name: cbrsup-universalk9.16.07.01a.SPA.bin
  pkg_name: cbrsup-programmable_firmware.16.07.01.SPA.pkg
  #if the pkg file in the TB, just modify dst_dir to the pkg location
  #the four examples shows the usage
  #example1
  #src_dir: "ftp://username:password@20.11.0.42:~/"
  #example2
  #src_dir: "tftp://192.168.3.47/ "
  #example3
```

```
        #src_dir: "usb0:"
        #example4
        src_dir: "harddisk:"

slot_info:
    #slot_to_upgrade: [2,3,6,7,8,9]
    slot_to_upgrade: "ALL"
```

Step 7   Execute following command to start the playbook to upgrade firmware.

./run_mop_upgrade

Step 8   Exit the container if finished upgrading this time to stop the container.

exit

Step 9   If user wants to start the container again, use following command to start the container and enter its shell.

docker start mop
docker attach mop

Step 10   All the file changes are kept in the container, user can run step 4-11 to upgrade again.

Upgrading from Cisco IOS XE Everest 16.6.1 to Cisco IOS XE Fuji 16.7.1a with ISSU

The correct firmware versions are listed in the tables below. Use the commands in the tables to verify the firmware versions.

Table 7: Firmware Versions

Internal Name	Component Name	Correct Version	Command
Supervisor CPLD	CBR-CCAP-SUP-160G Rommon CPLD	16052011	**show platform**
Supervisor ROMMON	CBR-CCAP-SUP-160G Rommon	16.6(1r)S	**show platform**
Linecard CPLD	CBR-CCAP-LC-40G CPLD	00000025	**show platform**
Linecard Uboot	CBR-CCAP-LC-40G Rommon	2011.03.18	**show platform**

Linecard PSOC	CBR-CCAP-LC-40G PSOC	4.6	**show platform diag**
Docsis 3.0 downstream module PSOC	CBR-CCAP-LC-40G Gemin1 PSOC	3.9	**show platform diag**
Docsis 3.0 downstream module CPLD	CBR-CCAP-LC-40G Gemini1 CPLD	0.7	**show platform diag**
Docsis 3.0 downstream module Micro	CBR-CCAP-LC-40G Gemin1 Micro	1.E	**show platform diag**
Docsis 3.0 downstream module FPGA	CBR-CCAP-LC-40G Gemini1 Apollo	2.F	**show platform diag**
Docsis 3.1 downstream module PSOC	CBR-CCAP-LC-40G Gemin2 PSOC	4.4	**show platform diag**
Docsis 3.1 downstream module CPLD	CBR-CCAP-LC-40G Gemini2 CPLD	0.7	**show platform diag**
Docsis 3.1 downstream module Micro	CBR-CCAP-LC-40G Gemin2 Micro	3.1A	**show platform diag**
Docsis 3.1 downstream module FPGA	CBR-CCAP-LC-40G Gemini2 Apollo	4.484B	**show platform diag**

Before you begin

Before upgrading the system, make sure the following requirements are met:

- Download two files from the following Cisco.com Software Center URL:

  https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

    - IOS XE Software Version 16.7.1a: **cbrsup-universalk9.16.07.01a.SPA.bin**

    - IOS XE Hardware Programmable Devices Version 16.7.1:
      cbrsup-programmable_firmware.16.07.01.SPA.pkg

Note   Do not power cycle the cBR-8 router during the firmware upgrade process. Power cycling the chassis may corrupt the ROMMON/Uboot image.

Step 1   Copy Cisco IOS-XE Fuji 16.7.1a package to bootflash: and stby-bootflash:.

```
copy <location>/cbrsup-universalk9.16.07.01a.SPA.bin bootflash:
copy <location>/cbrsup-universalk9.16.07.01a.SPA.bin stby-bootflash:
```

Step 2   Verify Cisco IOS-XE Fuji 16.7.1a package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 bootflash:cbrsup-universalk9.16.07.01a.SPA.bin
verify /md5 stby-bootflash:cbrsup-universalk9.16.07.01a.SPA.bin
```

Step 3   Copy the hardware programmable devices upgrade package to harddisk: and stby-harddisk:.

```
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg harddisk:
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg stby-harddisk:
```

Step 4   Verify the hardware programmable devices upgrade package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
verify /md5 stby-harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 5   Check system status prior to upgrade. Save the information to compare against the system status after upgrade. For the commands to use to check the status, see the **show** commands at the end of this section.

Step 6   Upgrade Docsis 3.1 downstream modules in all the slots.

```
upgrade hw-programmable cable <slot> dsphy micro
pkg_name/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 7   Wait for the system log message asking the user to reload the line card that was upgraded.

```
001860: Jun 15 19:05:05.904 PDT: %IOSXE-5-PLATFORM: CLC0: cdman: Suggest reload the line card for
new FW to take effect using CLI: hw slot <slot-id> reload
```

Step 8   Before the ISSU upgrade please check and make sure:

- The cBR-8 is in Subpackage mode.

- Both SUPs are running same image from same path.

- Autoboot is enabled.

- The cBR-8 has two SUP and in SSO mode, standby SUP is in standby hot mode.

- All linecards are in normal state in LCHA group. Use **show redundancy linecard all** command, active cards should be in **Stdby Warm** state.

- There is enough bootflash disk space on both SUP.

Step 9   Copy 16.7.1a image in the same folder of current boot package on active SUP.

Step 10   Make sure .issu folder and config files exists on both active and standby SUP harddisk. If no such folder exists or files missing, create a new one and generate files needed.

Step 11   Perform ISSU.

```
request platform software package install node file bootflash:cbrsup-universalk9.16.07.01a.SPA.bin
```

Step 12   To monitor the ISSU progress, use the command below.

```
request platform software package install node attach
```

Step 13   Use these CLI to check status after ISSU.

```
show version
show version r0 running
show version r1 running
show version r0 provisioned
show version r1 provisioned
```

Note   If both Docsis 3.1 OFDM channels and downstream load balancing are configured, then Docsis 3.1 CMs will come up in a Docsis 3.0 bonding group after ISSU from Cisco IOS XE Everest 16.6.x. The workaround procedure is:

a.   Admin shut all OFDM channels. This can be done from a script, or from cut and paste of the CLI. There is no need to have a delay between successive shuts. For example:

```
configure terminal
    controller Integrated-Cable 2/0/0
        rf-chan 158
            shut
end
```

b.   Wait for 30 seconds.

c.   Admin perform no-shut on all OFDM channels. This may be done from a script, or from cut and paste of the CLI. There is no need to have a delay between successive no-shuts. For example:

```
configure terminal
    controller Integrated-Cable 2/0/0
        rf-chan 158
            no shut
end
```

d.   Reset all Docsis 31 CMs. For example:

```
clear cable modem d31-capable reset
```

What to do next

Perform verification test to determine if the upgrade is successful, include:

- Verify the router is running the new IOS-XE release using **show version** command.

- Check facility alarms using **show facility-alarm status** command.

- Check the status of the power supplies using **show environment power** command.

- Check PS status using **show platform hardware slot P<0-5> mcu status** command.

- Complete trace routes to known good off-network IP address using the source address of customer CPE blocks to verify routing is working.

- Check logs for error messages using **show log** command.

These **show** commands may be useful in the verification test:

- **show redundancy**

- **show platform**

- **show platform diag**

- **show environment**

- **show redundancy linecard all**

- **show isis neighbors**

- **show ip ospf neighbor**

- **show ip route rip**

- **show ip mroute**

- **show cops servers**

- **show cable modem voice**

- **show cable calls**

- **show cable metering verbose**

- **show cable licenses all**

- **show inventory**

Upgrading the Cisco cBR-8 Router System to Cisco IOS XE Fuji 16.7.1

This section contains the upgrade procedures for the Cisco cBR-8 Router System.

Upgrading from Cisco IOS-XE 3.18.1aSP to Cisco IOS XE Fuji 16.7.1

The correct firmware versions are listed in the tables below. Use the commands in the tables to verify the firmware versions.

Table 8: Firmware Versions

Internal Name	Component Name	Correct Version	Command
Supervisor CPLD	CBR-CCAP-SUP-160G Rommon CPLD	16052011	**show platform**
Supervisor ROMMON	CBR-CCAP-SUP-160G Rommon	16.6(1r)S	**show platform**
Linecard CPLD	CBR-CCAP-LC-40G CPLD	00000025	**show platform**
Linecard Uboot	CBR-CCAP-LC-40G Rommon	2011.03.18	**show platform**
Linecard PSOC	CBR-CCAP-LC-40G PSOC	4.6	**show platform diag**
Docsis 3.0 downstream module PSOC	CBR-CCAP-LC-40G Gemin1 PSOC	3.9	**show platform diag**

Docsis 3.0 downstream module CPLD	CBR-CCAP-LC-40G Gemini1 CPLD	0.7	**show platform diag**
Docsis 3.0 downstream module Micro	CBR-CCAP-LC-40G Gemin1 Micro	1.E	**show platform diag**
Docsis 3.0 downstream module FPGA	CBR-CCAP-LC-40G Gemini1 Apollo	2.F	**show platform diag**
Docsis 3.1 downstream module PSOC	CBR-CCAP-LC-40G Gemin2 PSOC	4.4	**show platform diag**
Docsis 3.1 downstream module CPLD	CBR-CCAP-LC-40G Gemini2 CPLD	0.7	**show platform diag**
Docsis 3.1 downstream module Micro	CBR-CCAP-LC-40G Gemin2 Micro	3.1A	**show platform diag**
Docsis 3.1 downstream module FPGA	CBR-CCAP-LC-40G Gemini2 Apollo	4.484B	**show platform diag**
RF-PIC Firmware	CBR-RF-PIC	00000746	**show platform diag**
RF-PROT-PIC Firmware	CBR-RF-PROT-PIC	0000071E	**show platform diag**

Upgrading Manually

Before you begin

Before upgrading the system, make sure the following requirements are met:

- The firmware versions are not lower than the ones listed in Firmware versions table. Otherwise upgrade the firmware versions, see Upgrading the Cisco cBR-8 Router Firmware.

- Make sure Line Card CPLD version is 00000025. If the value is lower than 00000025, follow this procedure to upgrade the Line Card CPLD to version 00000025 first:

  http://www.cisco.com/c/en/us/td/docs/cable/cbr/upgrade/guide/b_cbr_upgrade-3-18s/b_cbr_upgrade_hardware.html#task_E0B78DCCC88A41749DA2783736CE37A6

- Download two files from the following Cisco.com Software Center URL:

  https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

    - IOS XE Software Version 16.7.1: **cbrsup-universalk9.16.07.01.SPA.bin**

- IOS XE Hardware Programmable Devices Version 16.7.1:
  cbrsup-programmable_firmware.16.07.01.SPA.pkg

- Console access for both SUPs are required.

- Ability to power cycle the chassis. Power cycle chassis is required to upgrade Supervisor CPLD.

Note   Do not power cycle the cBR-8 router during the firmware upgrade process. Power cycling the chassis may corrupt the ROMMON/Uboot image.

Step 1   Copy Cisco IOS-XE Fuji 16.7.1 package to bootflash: and stby-bootflash:.

```
copy <location>/cbrsup-universalk9.16.07.01.SPA.bin bootflash:
copy <location>/cbrsup-universalk9.16.07.01.SPA.bin stby-bootflash:
```

Step 2   Verify Cisco IOS-XE Fuji 16.7.1 package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 bootflash:cbrsup-universalk9.16.07.01.SPA.bin
verify /md5 stby-bootflash:cbrsup-universalk9.16.07.01.SPA.bin
```

Step 3   Copy the hardware programmable devices upgrade package to harddisk: and stby-harddisk:.

```
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg harddisk:
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg stby-harddisk:
```

Step 4   Verify the hardware programmable devices upgrade package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
verify /md5 stby-harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 5   Check system status prior to upgrade. Save the information to compare against the system status after upgrade. For the commands to use to check the status, see the **show** commands at the end of this section.

Step 6   Configure the chassis to boot the system with Cisco IOS-XE Fuji 16.7.1 image.

```
Configure terminal
no boot system
boot system bootflash:cbrsup-universalk9.16.07.01.SPA.bin
end
write mem
```

Step 7   Reload the cBR-8 router.

```
Reload
```

Note   The system will reload twice.

Step 8   Remove the secondary line card from line card redundancy group if redundancy is configured.

```
Configure terminal
redundancy
linecard-group 0 internal-switch
no member slot 0 secondary
end
```

Step 9   Configure config-register to manual boot.

```
Configure terminal
config-register 0x0
end
```

Step 10   Upgrade Docsis 3.1 downstream modules in all the slots.

```
upgrade hw-programmable cable <slot> dsphy auto
pkg_name/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 11   Upgrade Supervisor 0/1 CPLD.

```
upgrade hw-programmable cable r0 viper pkg_name
/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
upgrade hw-programmable cable r1 viper pkg_name
/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 12   Make sure the line card Docsis 3.1 downstream modules upgrade has completed successfully by examining the system log:

```
Show logging | include slot-id
001860: Jun 15 19:05:05.904 PDT: %IOSXE-5-PLATFORM: CLC0: cdman: Suggest reload the line card for
new FW to take effect using CLI: hw slot <slot-id> reload
```

Step 13   Reload the cBR-8 router. Answer **no** to not save the configuration.

```
cBR8#reload
System configuration has been modified. Save? [yes/no]: no
Proceed with reload? [confirm]
cBR8#
```

Step 14   Configure to automatic boot by typing following command in **rommon >** prompt.

```
rommon 1 > confreg 0x2102
rommon 2 > sync
rommon 3 >
```

Step 15   Power cycle chassis, wait for both SUPs to auto boot to 16.7.1 image.

What to do next

Perform verification test to determine if the upgrade is successful, include:

- Verify the router is running the new IOS-XE release using **show version** command.

- Check facility alarms using **show facility-alarm status** command.

- Check the status of the power supplies using **show environment power** command.

- Check PS status using **show platform hardware slot P<0-5> mcu status** command.

- Complete trace routes to known good off-network IP address using the source address of customer CPE blocks to verify routing is working.

- Check logs for error messages using **show log** command.

These **show** commands may be useful in the verification test:

- **show redundancy**

- **show platform**

- **show platform diag**

- **show environment**

- **show redundancy linecard all**

- **show isis neighbors**

- **show ip ospf neighbor**

- **show ip route rip**

- **show ip mroute**

- **show cops servers**

- **show cable modem voice**

- **show cable calls**

- **show cable metering verbose**

- **show cable licenses all**

- **show inventory**

Upgrading with Ansible

Before you begin

Before upgrading the firmware, make sure the following requirements are met:

1. Prepare Ansible Server, operating system can be Linux/Windows/Mac, with docker service pre-installed.

   For docker installation guide, please check following link:

   https://docs.docker.com/engine/installation/

2. Check if the chassis supports AAA or local authentication with username & password. If not configured, use following CLI to enable local authentication, for example:

   ```
   Cbr8#configure terminal
   Enter configuration commands, one per line.  End with CNTL/Z.
   cBR8(config)#username cisco privilege 15 password 0 cisco
   cBR8(config)#enable secret cisco
   cBR8(config)#line vty 0 15
   cBR8(config)#login local
   cBR8(config)#exec-timeout 0 0
   cBR8(config)#session-timeout 0
   cBR8(config)#exit
   ```

3. If SSH is not enabled, use following CLI to enable SSH on cBR8, skip the domain name configuration if already configured.

   ```
   cBR8(config)# ip domain-name domain.com
   cBR8(config)#crypto key generate rsa
   The name for the keys will be: cbr8.domain.com
   Choose the size of the key modulus in the range of 360 to 4096 for your
   General Purpose Keys. Choosing a key modulus greater than 512 may take
   a few minutes.

   How many bits in the modulus [512]: 1024
   % Generating 1024 bit RSA keys, keys will be non-exportable...
   [OK] (elapsed time was 0 seconds)

   cBR8(config)#end
   cBR8#copy running-config startup-config
   cBR8#show ip ssh
   SSH Enabled - version 1.99
   ```

4. Check if there is enough bootflash disk space on both SUP (>1.8GB).

5. Verify if the Ansible server can access cBR-8 using SSH.

   ```
   [ansible@server ~]$ ssh cisco@100.0.0.1
   The authenticity of host '100.0.0.1 (100.0.0.1)' can't be established.
   RSA key fingerprint is c3:be:8f:cf:76:f4:31:4b:80:d8:2e:f0:76:6d:ff:bf.
   Are you sure you want to continue connecting (yes/no)? yes
   Warning: Permanently added '100.0.0.1' (RSA) to the list of known hosts.
   Password:
   cBR8#
   ```

6. Download three files from the following Cisco.com Software Center URL:

   https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

   - IOS XE Software Version 16.7.1: **cbrsup-universalk9.16.07.01.SPA.bin**

   - IOS XE Hardware Programmable Devices Version 16.7.1: **cbrsup-programmable_firmware.16.07.01_compat_with_3.18SP.SSA.pkg**

   - Ansible upgrade script: **cbr-8_upgrade_ansible_16.7.1a.tar**

7. Copy IOS XE Software package and IOS XE Hardware Programmable Devices package to TFTP/FTP/SCP server or usb disk. Upload Ansible upgrade script to Ansible server.

8. Console access for both SUPs are required.

9. Ability to power cycle the chassis. Power cycle chassis is required to upgrade Supervisor CPLD.

Step 1   Run following CLI on the Ansible server to create the docker image.

```
docker import cbr-8_upgrade_ansible_16.7.1a.tar ansible_mop
```

Step 2   Start docker container with the image and enter the container shell.

```
docker run -it --name=mop ansible_mop /bin/bash
```

Step 3   Change current directory to the playbook folder for this software and firmware upgrade.

```
cd /opt/cbr-8_upgrade_ansible_3.18sp_to_16.7.1a
```

Step 4   Modify hosts file to add target cBR-8 ip addresses, can be multiple lines if customer wants to upgrade firmware on multiple cBR8 routers simultaneously, sample file is as below:

```
[cbr]
100.110.110.110
100.185.185.185
```

Step 5   Modify secrets.yaml file, change the username/password/enable password to reflect the real username/password/enable configuration for target cBR. If no enable password is set, just keep the sample **cisco** for **auth_pass**.

```
creds:
  username: cisco
  password: cisco
  auth_pass: cisco
```

Step 6   Modify upgrade_vars.yaml file to indicate the firmware package name, ios image name and source (Optional if the package files are already on cbr-8 harddisk:).

```
file_info:
  image_name: cbrsup-universalk9.16.07.01.SPA.bin
  pkg_name: cbrsup-programmable_firmware.16.07.01_compat_with_3.18SP.SSA.pkg
  #if the pkg file in the TB, just modify dst_dir to the pkg location
  #the four examples shows the usage
  #example1
  #src_dir: "ftp://username:password@20.11.0.42:~/"
  #example2
  #src_dir: "tftp://192.168.3.47/ "
  #example3
  #src_dir: "usb0:"
  #example4
  src_dir: "harddisk:"

slot_info:
  #slot_to_upgrade: [2,3,6,7,8,9]
  slot_to_upgrade: "ALL"
```

Step 7   Execute following command to start the playbook to upgrade firmware.

./run_mop_upgrade

Step 8   Reload the system by typing **reload** on the active SUP and answering **no** to not save the configuration.

```
cBR8#reload
System configuration has been modified. Save? [yes/no]: no
Proceed with reload? [confirm]
cBR8#
```

Step 9   From ROMMON issue the following command on both SUPs.

```
rommon 1 > confreg 0x2102
rommon 2 > sync
rommon 3 >
```

Step 10   Power cycle chassis, wait for both SUPs to auto boot to 16.7.1 image.

```
rommon 1>
Initializing Hardware ...

?

System Bootstrap, Version 16.6(2r)S, RELEASE SOFTWARE
Copyright (c) 1994-2016  by cisco Systems, Inc.

Current image running: Boot ROM1

Last reset cause: PowerOn

Viper version register: 0x16052011
Set Chassis Type to 13RU
Cisco cBR-8  platform with 50331648 Kbytes of main memory
```

Step 11   After system bootup and stable, execute following command to start the playbook to check the upgrade result.

```
./run_mop_upgrade_post

…
TASK [debug] ********************************************************************
Friday 17 March 2017  14:30:25 +0800 (0:00:00.014)       0:01:10.187 **********
ok: [100.185.185.185] => {
    "msg": "Mop upgrade passed!"
}
PLAY RECAP *********************************************************************
100.185.185.185            : ok=120   changed=1    unreachable=0    failed=0
```

Step 12   Exit the container if finished upgrading this time to stop the container.

exit

Step 13   If user wants to start the container again, use following command to start the container and enter its shell.

```
docker start mop
docker attach mop
```

Step 14   All the file changes are kept in the container, user can run step 4-11 to upgrade again.

Upgrading from Cisco IOS XE Everest 16.x to Cisco IOS XE Fuji 16.7.1

The correct firmware versions are listed in the tables below. Use the commands in the tables to verify the firmware versions.

Table 9: Firmware Versions

Internal Name	Component Name	Correct Version	Command
Supervisor CPLD	CBR-CCAP-SUP-160G Rommon CPLD	16052011	**show platform**
Supervisor ROMMON	CBR-CCAP-SUP-160G Rommon	16.6(1r)S	**show platform**
Linecard CPLD	CBR-CCAP-LC-40G CPLD	00000025	**show platform**
Linecard Uboot	CBR-CCAP-LC-40G Rommon	2011.03.18	**show platform**
Linecard PSOC	CBR-CCAP-LC-40G PSOC	4.6	**show platform diag**
Docsis 3.0 downstream module PSOC	CBR-CCAP-LC-40G Gemin1 PSOC	3.9	**show platform diag**
Docsis 3.0 downstream module CPLD	CBR-CCAP-LC-40G Gemini1 CPLD	0.7	**show platform diag**
Docsis 3.0 downstream module Micro	CBR-CCAP-LC-40G Gemin1 Micro	1.E	**show platform diag**
Docsis 3.0 downstream module FPGA	CBR-CCAP-LC-40G Gemini1 Apollo	2.F	**show platform diag**

Docsis 3.1 downstream module PSOC	CBR-CCAP-LC-40G Gemin2 PSOC	4.4	**show platform diag**
Docsis 3.1 downstream module CPLD	CBR-CCAP-LC-40G Gemini2 CPLD	0.7	**show platform diag**
Docsis 3.1 downstream module Micro	CBR-CCAP-LC-40G Gemin2 Micro	3.1A	**show platform diag**
Docsis 3.1 downstream module FPGA	CBR-CCAP-LC-40G Gemini2 Apollo	4.484B	**show platform diag**

Upgrading Manually

Before you begin

Before upgrading the system, make sure the following requirements are met:

- Download two files from the following Cisco.com Software Center URL:

  https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

    - IOS XE Software Version 16.7.1: **cbrsup-universalk9.16.07.01.SPA.bin**

    - IOS XE Hardware Programmable Devices Version 16.7.1: **cbrsup-programmable_firmware.16.07.01.SPA.pkg**

- Console access for both SUPs are required.

> **Note** Do not power cycle the cBR-8 router during the firmware upgrade process. Power cycling the chassis may corrupt the ROMMON/Uboot image.

Step 1 Copy Cisco IOS-XE Fuji 16.7.1 package to bootflash: and stby-bootflash:.

```
copy <location>/cbrsup-universalk9.16.07.01.SPA.bin bootflash:
copy <location>/cbrsup-universalk9.16.07.01.SPA.bin stby-bootflash:
```

Step 2 Verify Cisco IOS-XE Fuji 16.7.1 package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 bootflash:cbrsup-universalk9.16.07.01.SPA.bin
verify /md5 stby-bootflash:cbrsup-universalk9.16.07.01.SPA.bin
```

Step 3 Copy the hardware programmable devices upgrade package to harddisk: and stby-harddisk:.

```
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg harddisk:
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg stby-harddisk:
```

Step 4 Verify the hardware programmable devices upgrade package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
verify /md5 stby-harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 5 Check system status prior to upgrade. Save the information to compare against the system status after upgrade. For the commands to use to check the status, see the **show** commands at the end of this section.

Step 6 Configure the chassis to boot the system with Cisco IOS-XE Fuji 16.7.1 image.

```
Configure terminal
no boot system
boot system bootflash:cbrsup-universalk9.16.07.01.SPA.bin
end
write mem
```

Step 7 Reload the cBR-8 router.

```
Reload
```

Note The system will reload twice.

Step 8 Remove the secondary line card from line card redundancy group if redundancy is configured.

```
Configure terminal
redundancy
linecard-group 0 internal-switch
no member slot 0 secondary
end
```

Step 9 Upgrade Docsis 3.1 downstream modules in all the slots.

```
upgrade hw-programmable cable <slot> dsphy micro
pkg_name/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 10 Wait for the system log message asking the user to reload the line card that was upgraded.

```
001860: Jun 15 19:05:05.904 PDT: %IOSXE-5-PLATFORM: CLC0: cdman: Suggest reload the line card for
new FW to take effect using CLI: hw slot <slot-id> reload
```

Step 11 Reload Docsis 3.1 downstream modules in all the slots.

```
hw slot <slot> reload
```

Step 12 Add secondary line card into line card redundancy group.

```
configure terminal
redundancy
linecard-group 0 internal-switch
member slot 0 secondary
end
```

What to do next

Perform verification test to determine if the upgrade is successful, include:

- Verify the router is running the new IOS-XE release using **show version** command.

- Check facility alarms using **show facility-alarm status** command.

- Check the status of the power supplies using **show environment power** command.

- Check PS status using **show platform hardware slot P<0-5> mcu status** command.

- Complete trace routes to known good off-network IP address using the source address of customer CPE blocks to verify routing is working.

- Check logs for error messages using **show log** command.

These **show** commands may be useful in the verification test:

- **show redundancy**

- **show platform**

- **show platform diag**

- **show environment**

- **show redundancy linecard all**

- **show isis neighbors**

- **show ip ospf neighbor**

- **show ip route rip**

- **show ip mroute**

- **show cops servers**

- **show cable modem voice**

- **show cable calls**

- **show cable metering verbose**

- **show cable licenses all**

- **show inventory**

Upgrading with Ansible

Before you begin

Before upgrading the firmware, make sure the following requirements are met:

1. Prepare Ansible Server, operating system can be Linux/Windows/Mac, with docker service pre-installed.

   For docker installation guide, please check following link:

   https://docs.docker.com/engine/installation/

2. Check if the chassis supports AAA or local authentication with username & password. If not configured, use following CLI to enable local authentication, for example:

   ```
   Cbr8#configure terminal
   Enter configuration commands, one per line.  End with CNTL/Z.
   cBR8(config)#username cisco privilege 15 password 0 cisco
   cBR8(config)#enable secret cisco
   cBR8(config)#line vty 0 15
   cBR8(config)#login local
   cBR8(config)#exec-timeout 0 0
   cBR8(config)#session-timeout 0
   cBR8(config)#exit
   ```

3. If SSH is not enabled, use following CLI to enable SSH on cBR8, skip the domain name configuration if already configured.

   ```
   cBR8(config)# ip domain-name domain.com
   cBR8(config)#crypto key generate rsa
   The name for the keys will be: cbr8.domain.com
   Choose the size of the key modulus in the range of 360 to 4096 for your
   General Purpose Keys. Choosing a key modulus greater than 512 may take
   a few minutes.

   How many bits in the modulus [512]: 1024
   % Generating 1024 bit RSA keys, keys will be non-exportable...
   [OK] (elapsed time was 0 seconds)

   cBR8(config)#end
   cBR8#copy running-config startup-config
   cBR8#show ip ssh
   SSH Enabled - version 1.99
   ```

4. Check if there is enough bootflash disk space on both SUP (>1.8GB).

5. Verify if the Ansible server can access cBR-8 using SSH.

   ```
   [ansible@server ~]$ ssh cisco@100.0.0.1
   The authenticity of host '100.0.0.1 (100.0.0.1)' can't be established.
   RSA key fingerprint is c3:be:8f:cf:76:f4:31:4b:80:d8:2e:f0:76:6d:ff:bf.
   Are you sure you want to continue connecting (yes/no)? yes
   Warning: Permanently added '100.0.0.1' (RSA) to the list of known hosts.
   Password:
   cBR8#
   ```

6. Download three files from the following Cisco.com Software Center URL:

   https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

   • IOS XE Software Version 16.7.1: **cbrsup-universalk9.16.07.01.SPA.bin**

         • IOS XE Hardware Programmable Devices Version 16.7.1:
         cbrsup-programmable_firmware.16.07.01.SPA.pkg

         • Ansible upgrade script: **cbr-8_upgrade_ansible_16.7.1a.tar**

7. Copy IOS XE Software package and IOS XE Hardware Programmable Devices package to TFTP/FTP/SCP server or usb disk. Upload Ansible upgrade script to Ansible server.

8. Console access for both SUPs are required.

9. Ability to power cycle the chassis. Power cycle chassis is required to upgrade Supervisor CPLD.

Step 1 Run following CLI on the Ansible server to create the docker image.

```
docker import cbr-8_upgrade_ansible_16.7.1a.tar ansible_mop
```

Step 2 Start docker container with the image and enter the container shell.

```
docker run -it --name=mop ansible_mop /bin/bash
```

Step 3 Change current directory to the playbook folder for this software and firmware upgrade.

```
cd /opt/cbr-8_upgrade_ansible_16.x_to_16.7.1a
```

Step 4 Modify hosts file to add target cBR-8 ip addresses, can be multiple lines if customer wants to upgrade firmware on multiple cBR8 routers simultaneously, sample file is as below:

```
[cbr]
100.110.110.110
100.185.185.185
```

Step 5 Modify secrets.yaml file, change the username/password/enable password to reflect the real username/password/enable configuration for target cBR. If no enable password is set, just keep the sample **cisco** for **auth_pass**.

```
creds:
  username: cisco
  password: cisco
  auth_pass: cisco
```

Step 6 Modify upgrade_vars.yaml file to indicate the firmware package name, ios image name and source (Optional if the package files are already on cbr-8 harddisk:).

```
file_info:
  image_name: cbrsup-universalk9.16.07.01.SPA.bin
  pkg_name: cbrsup-programmable_firmware.16.07.01.SPA.pkg
  #if the pkg file in the TB, just modify dst_dir to the pkg location
  #the four examples shows the usage
  #example1
  #src_dir: "ftp://username:password@20.11.0.42:~/"
  #example2
  #src_dir: "tftp://192.168.3.47/ "
  #example3
```

```
            #src_dir: "usb0:"
            #example4
            src_dir: "harddisk:"

        slot_info:
          #slot_to_upgrade: [2,3,6,7,8,9]
          slot_to_upgrade: "ALL"
```

Step 7   Execute following command to start the playbook to upgrade firmware.

`./run_mop_upgrade`

Step 8   Exit the container if finished upgrading this time to stop the container.

`exit`

Step 9   If user wants to start the container again, use following command to start the container and enter its shell.

`docker start mop`
`docker attach mop`

Step 10   All the file changes are kept in the container, user can run step 4-11 to upgrade again.

Upgrading from Cisco IOS XE Everest 16.6.1 to Cisco IOS XE Fuji 16.7.1 with ISSU

The correct firmware versions are listed in the tables below. Use the commands in the tables to verify the firmware versions.

Table 10: Firmware Versions

Internal Name	Component Name	Correct Version	Command
Supervisor CPLD	CBR-CCAP-SUP-160G Rommon CPLD	16052011	**show platform**
Supervisor ROMMON	CBR-CCAP-SUP-160G Rommon	16.6(1r)S	**show platform**
Linecard CPLD	CBR-CCAP-LC-40G CPLD	00000025	**show platform**
Linecard Uboot	CBR-CCAP-LC-40G Rommon	2011.03.18	**show platform**

Linecard PSOC	CBR-CCAP-LC-40G PSOC	4.6	**show platform diag**
Docsis 3.0 downstream module PSOC	CBR-CCAP-LC-40G Gemin1 PSOC	3.9	**show platform diag**
Docsis 3.0 downstream module CPLD	CBR-CCAP-LC-40G Gemini1 CPLD	0.7	**show platform diag**
Docsis 3.0 downstream module Micro	CBR-CCAP-LC-40G Gemin1 Micro	1.E	**show platform diag**
Docsis 3.0 downstream module FPGA	CBR-CCAP-LC-40G Gemini1 Apollo	2.F	**show platform diag**
Docsis 3.1 downstream module PSOC	CBR-CCAP-LC-40G Gemin2 PSOC	4.4	**show platform diag**
Docsis 3.1 downstream module CPLD	CBR-CCAP-LC-40G Gemini2 CPLD	0.7	**show platform diag**
Docsis 3.1 downstream module Micro	CBR-CCAP-LC-40G Gemin2 Micro	3.1A	**show platform diag**
Docsis 3.1 downstream module FPGA	CBR-CCAP-LC-40G Gemini2 Apollo	4.484B	**show platform diag**

Before you begin

Before upgrading the system, make sure the following requirements are met:

- Download two files from the following Cisco.com Software Center URL:

  https://software.cisco.com/download/type.html?mdfid=286283913&flowid=73842

  - IOS XE Software Version 16.7.1: **cbrsup-universalk9.16.07.01.SPA.bin**

  - IOS XE Hardware Programmable Devices Version 16.7.1: **cbrsup-programmable_firmware.16.07.01.SPA.pkg**

Note   Do not power cycle the cBR-8 router during the firmware upgrade process. Power cycling the chassis may corrupt the ROMMON/Uboot image.

Step 1   Copy Cisco IOS-XE Fuji 16.7.1 package to bootflash: and stby-bootflash:.

```
copy <location>/cbrsup-universalk9.16.07.01.SPA.bin bootflash:
copy <location>/cbrsup-universalk9.16.07.01.SPA.bin stby-bootflash:
```

Step 2   Verify Cisco IOS-XE Fuji 16.7.1 package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 bootflash:cbrsup-universalk9.16.07.01.SPA.bin
verify /md5 stby-bootflash:cbrsup-universalk9.16.07.01.SPA.bin
```

Step 3   Copy the hardware programmable devices upgrade package to harddisk: and stby-harddisk:.

```
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg harddisk:
copy <location>/cbrsup-programmable_firmware.16.07.01.SPA.pkg stby-harddisk:
```

Step 4   Verify the hardware programmable devices upgrade package against the md5 hash as provided in the Cisco.com Software center.

```
verify /md5 harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
verify /md5 stby-harddisk:cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 5   Check system status prior to upgrade. Save the information to compare against the system status after upgrade. For the commands to use to check the status, see the **show** commands at the end of this section.

Step 6   Upgrade Docsis 3.1 downstream modules in all the slots.

```
upgrade hw-programmable cable <slot> dsphy micro
pkg_name/harddisk/cbrsup-programmable_firmware.16.07.01.SPA.pkg
```

Step 7   Wait for the system log message asking the user to reload the line card that was upgraded.

```
001860: Jun 15 19:05:05.904 PDT: %IOSXE-5-PLATFORM: CLC0: cdman: Suggest reload the line card for
new FW to take effect using CLI: hw slot <slot-id> reload
```

Step 8   Before the ISSU upgrade please check and make sure:

- The cBR-8 is in Subpackage mode.

- Both SUPs are running same image from same path.

- Autoboot is enabled.

- The cBR-8 has two SUP and in SSO mode, standby SUP is in standby hot mode.

- All linecards are in normal state in LCHA group. Use **show redundancy linecard all** command, active cards should be in **Stdby Warm** state.

- There is enough bootflash disk space on both SUP.

Step 9 Copy 16.7.1 image in the same folder of current boot package on active SUP.

Step 10 Make sure .issu folder and config files exists on both active and standby SUP harddisk. If no such folder exists or files missing, create a new one and generate files needed.

Step 11 Perform ISSU.

```
request platform software package install node file bootflash:cbrsup-universalk9.16.07.01.SPA.bin
```

Step 12 To monitor the ISSU progress, use the command below.

```
request platform software package install node attach
```

Step 13 Use these CLI to check status after ISSU.

```
show version
show version r0 running
show version r1 running
show version r0 provisioned
show version r1 provisioned
```

Note If both Docsis 3.1 OFDM channels and downstream load balancing are configured, then Docsis 3.1 CMs will come up in a D3.0 bonding group after ISSU from Cisco IOS XE Everest 16.6.x. The workaround procedure is:

   a. Admin shut all OFDM channels. This can be done from a script, or from cut and paste of the CLI. There is no need to have a delay between successive shuts. For example:

```
configure terminal
    controller Integrated-Cable 2/0/0
        rf-chan 158
            shut
end
```

   b. Wait for 30 seconds.

   c. Admin perform no-shut on all OFDM channels. This may be done from a script, or from cut and paste of the CLI. There is no need to have a delay between successive no-shuts. For example:

```
configure terminal
    controller Integrated-Cable 2/0/0
        rf-chan 158
            no shut
end
```

   d. Reset all Docsis 31 CMs. For example:

```
clear cable modem d31-capable reset
```

What to do next

Perform verification test to determine if the upgrade is successful, include:

   • Verify the router is running the new IOS-XE release using **show version** command.

   • Check facility alarms using **show facility-alarm status** command.

   • Check the status of the power supplies using **show environment power** command.

- Check PS status using **show platform hardware slot P<0-5> mcu status** command.

- Complete trace routes to known good off-network IP address using the source address of customer CPE blocks to verify routing is working.

- Check logs for error messages using **show log** command.

These **show** commands may be useful in the verification test:

- **show redundancy**
- **show platform**
- **show platform diag**
- **show environment**
- **show redundancy linecard all**
- **show isis neighbors**
- **show ip ospf neighbor**
- **show ip route rip**
- **show ip mroute**
- **show cops servers**
- **show cable modem voice**
- **show cable calls**
- **show cable metering verbose**
- **show cable licenses all**
- **show inventory**